Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO.

DATE REC'D AT LAB

Lab Name & Address

LAB ID NO.

ADHS Permit No. G-0020-02

Sample Location TEI Well No. 1

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A. Lindroos

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L,	< 0 .01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	,
TDS	P00500,	. ,	Tritium[b]	P8212R,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

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ADEQ — OWQ
COMPLIANCE SECTION

Analysis Date

Analyst Gary Lindroos

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
1005 North Central
Phoenix, Arizona 85004

Comments: Field Summary: January, February, March, 1989. Method of Analysis HACH DR 1/A Colorimeter

000210

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO.

DATE REC'D AT LAB

Lab[illegible]ne & Address

LAB ID NO.

ADHS Permit No. G-0020-02

Sample Location TEI Well No. 2

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A. Lindroos

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L,	<0.01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

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nd 3 c[illegible]es of completed form to:

fice of Waste and Water Quality Mgmt.
mpliance Section
om 304
05 North Central
oenix, Arizona 85004

Comments: Field Summary: January, February, March, 1989. Mehthod of Analysis HACH DR 1/A Colorimeter

Analysis Date

Analyst

000211

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____

DATE REC'D AT LAB _____

Lab[illegible]ne & Address

LAB ID NO.

ADHS Permit No. G-0020-02

Sample Location Leak Detection Systems

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A. Lindroos

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

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COMPLIANCE SECTION

nd 3 c[illegible]s of completed form to:

fice of Waste and Water Quality Mgmt.
mpliance Section
om 304
05 North Central
oenix, Arizona 85004

Comments: Field Summary: January, February, March 1989.

NO MOISTURE DETECTED

Analysis Date _____

Analyst Gary Lindroos

000212

PBR MINERALS, INC.
P.O. BOX 370
TOMBSTONE, ARIZONA 85638
(602) 457-2282

G-0020-02

May 1, 1989

Arizona Department of Environmental Quality
Office of Water Quality
Water Pollution Control Compliance Unit
2005 N. Central Avenue
Phoenix, Arizona 85004

Dear Sirs:

On April 20, 1989, Farmers Pump Company, 800 E. Maley, Willcox, Arizona conducted a pump test on TEI Well No. 2 with the following results:

Static Water Level	440'
Draw Down Level	452' (12' drawdown)
Recovery Time	15 minutes

Respectfully Submitted,

PBR MINERALS, INC.

Gary A. Lindroos
Technical Superintendent
and Vice President

GAL:cr

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MAY 2 - 1989
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COMPLIANCE SECTION

PBR MINERALS, INC.
P.O. BOX 370
TOMBSTONE, ARIZONA 85638
(602) 457-2282

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JUL 27 1989
ADEQ — OWQ
COMPLIANCE SECTION

July 26, 1989

Arizona Department of Environmental Quality
Office of Waste and Water Quality Management
Compliance Section
2005 North Central Avenue
Phoenix, Arizona 85004

RE: Permit No. G-0020-02

Dear Sirs:

The following is the field summary for the months of April, May, and June, 1989.

LOCATION	FREE CYANIDE	LAB ANALYSIS
TEI Well No. 1	Mg/L	< 0.01
TEI Well No. 2	Mg/L	< 0.01
PBR Well No. 4	Mg/L	< 0.01
Tombstone City Well No. 1	Mg/L	< 0.01
Leak Detection Systems	---NO MOISTURE DETECTED---	

The method of analysis for all samples was Hach DR 1/A Colorimeter.

Should you have any questions pertaining to this report, please feel free to contact me at the number listed above.

Sincerely,
PBR MINERALS, INC.

Gary A. Lindroos
Technical Superintendent

GAL:cr
Enclosures

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____ DATE REC'D AT LAB _____

Lab Name & Address — LAB ID NO.

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JUL 27 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location TEI WELL NO. 1

Facility Name & Mailing Address
PBR Minerals, Inc.
P.O. Box 370
Tombstone, AZ 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0 . 01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

d 3 co of completed form to:

ce of Waste and Water Quality Mgmt.
npliance Section
m 304
5 North Central
enix, Arizona 85004

Comments: Field Summary: April, May and June, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date _____

Analyst Gloria Lindsey

000215

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO.

DATE REC'D AT LAB

Lab Name & Address

LAB ID NO.

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ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location TEI WELL NO. 2

Facility Name & Mailing Address
PBR Minerals, Inc.
P.O. Box 370
Tombstone, AZ 85638

SAMPLE COLLECTION INFORMATION

XX Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0 . 01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
1005 North Central
Phoenix, Arizona 85004

Comments: Field Summary: April, May and June, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date

Analyst

000216

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____ DATE REC'D AT LAB _____

Lab Name & Address — LAB ID NO.

ADHS Permit No. G-0020-02

Sample Location PBR WELL NO. 4

RECEIVED JUL 27 1989 ADEQ — OWQ COMPLIANCE SECTION

Facility Name & Mailing Address
PBR Minerals, Inc.
P.O. Box 370
Tombstone, AZ 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0 . 01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

Units are mg/l unless otherwise noted.

[a] Units are μg/l
[b] Units are pCi/l

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
5 North Central
Phoenix, Arizona 85004

Comments: Field Summary: April, May and June, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date _____

Analyst _____

000217

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____ DATE REC'D AT LAB _____

Lab Name & Address — LAB ID NO.

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JUL 27 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well No. 1

Facility Name & Mailing Address
PBR Minerals, Inc.
P.O. Box 370
Tombstone, AZ 85638

SAMPLE COLLECTION INFORMATION
☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other _____
Sample Date _____ Sample Time _____
Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019
Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
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Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0 . 01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
5 North Central
Phoenix, Arizona 85004

Comments: Field Summary: April, May and June, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date _____
Analyst _____

000218

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO.

DATE REC'D AT LAB

Lab Name & Address

LAB ID NO.

RECEIVED
JUL 27 1989
ADEQ — DWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location Leak Detection Systems

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, AZ 85638

SAMPLE COLLECTION INFORMATION

☐ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
205 North Central
Phoenix, Arizona 85004

Comments: Field Summary: April, May and June, 1989.

NO MOISTURE DETECTED

Analysis Date

Analyst

000219

MAY, JUNE & July
1989

1989

Lab Analysis Data

000220

Groundwater Quality Protection Permit

Self-Monitoring Report Form
Arizona Department of Health Services

767301
SPECIMEN NO.

RECEIVED 08/03/89
DATE REC'D AT LAB

SEP 06 1989

ADEQ — OWQ
COMPLIANCE SECTION

b Name & Address — LAB ID NO. 00002

Arizona Testing Laboratories
81[illegible] West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tei Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 07/31/89 Sample Time 7:45 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A. Lindroos

DHS Use Only

S C

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	,	Endrin[a]	P39390,	,
Barium +	P01007,	,	Lindane[a]	P39782,	,
Cadmium +	P01027,	,	MethoxyChlor[a]	P39480,	,
Chromium +	P01034,	,	Toxaphene[a]	P39400,	,
Lead +	P01051,	,	2,4-D[a]	P39730,	,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	,
Nitrate(N)	P00620,	2.0 ,	TTHM[a]	P82080,	,
Selenium +	P01147,	,	Cyanide, Free	,	< 0.01 ,
Silver +	P01077,	,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	,	Potassium	,	2.5 ,
	,	,	Carbonate	,	0. ,
Alkalinity	P00410,	,	Bicarbonate	,	210. ,
Calcium	P00916,	,		,	,
Chlori[illegible]	P00940,	,		,	,
Copper +	P01042,	,		,	,
Hardness	P00900,	,	Radium-226/228[b]	P11503,	,
Iron +	P01045,	,	Gross Alpha, Tot[b]	P01501,	,
Magnesium	P00927,	,	— Count Error[b]	P01502,	,
Manga[illegible]e +	P01055,	,	Beta Activity[b]	P03501,	,
pH	P00403,	,	Cesium-134[b]	P28414,	,
Sodium	P00929,	18. ,	Iodine-131[b]	P28301,	,
Sulfate	P00945,	30. ,	Strontium-90/89[b]	P01082,	,
TDS	P00500,	,	Tritium[b]	P82126,	,
Zinc +	P01092,	,	Uranium[b]	P22706,	,

Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

000221

d 3 copies of completed form to:
ona Department of Health Services
ce of Waste and Water Quality Mgmt.
npliance Section
m 304
North Central

Comments:
cc: City of Tombstone

Analysis Date 08/30/89
Analyst S. Hankins

G. ndwater Quality Protection Pe

Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
SEP 0 6 1989
ADEQ — OWQ
COMPLIANCE SECTION

767302
SPECIMEN NO.

08/03/89
DATE REC'D AT LAB

b Name & Address — LAB ID NO.

rizona Testing Laboratories
17 West Madison
ho ix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tei Well #2

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 07/31 89 Sample Time 8:20 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A Lindroos

HS Use Only

C.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
rsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
arium +	P01007,	. ,	Lindane[a]	P39782,	. ,
adm +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
hromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
ead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
ercury +	P71900,	0.0055 ,	2,4,5-TP Silvex[a]	P39045,	. ,
itrate(N)	P00620,	19.6 ,	TTHM[a]	P82080,	. ,
elenium +	P01147,	. ,	Cyanide, Free	,	< 0.01 ,
ilver +	P01077,	. ,	Cyanide, Total	,	0.04 ,
luoride	P00951,	. ,	Potassium	,	3.3 ,
	,	. ,	Carbonate	,	0. ,
lkalinity	P00410,	. ,	Bicarbonate	,	200. ,
alcium	P00916,	. ,		,	. ,
hlori	P00940,	. ,		,	. ,
opper +	P01042,	. ,		,	. ,
ardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
on +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
agnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
anga e +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
H	P00403,	. ,	Cesium-134[b]	P28414,	. ,
odium	P00929,	26. ,	Iodine-131[b]	P28301,	. ,
ulfate	P00945,	88. ,	Strontium-90/89[b]	P01082,	. ,
DS	P00500,	. ,	Tritium[b]	P82126,	. ,
inc +	P01092,	. ,	Uranium[b]	P22706,	. ,

Units a mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

000222

d 3 copies of completed form to:
ona Department of Health Services
e of Waste and Water Quality Mgmt.
pliance Section
m 304
North Central

Comments:
cc: City of Tombstone

Analysis Date 08/30/89
Analyst S. Hankins

Received ADEQ on 09/06/89 (RKV)

C undwater Quality Protection P lt

Self-Monitoring Report Form
Arizona Department of Health Services

767303
SPECIMEN NO.

08/03/89
DATE REC'D AT LAB

b Name & Address — LAB ID NO. 00002

Arizona Testing Laboratories
817 West Madison
Ph nix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location PBR Well #4

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 07/31/89 Sample Time 9:10 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A. Lindroos

DHS Use Only

S C

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadm m +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	8.8 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Cyanide, Free	,	< 0.01 ,
Silver +	P01077,	. ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Potassium	,	3.4 ,
	,	. ,	Carbonate	,	0. ,
Alkalinity	P00410,	. ,	Bicarbonate	,	210. ,
Calcium	P00916,	. ,		,	. ,
Chlor	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
ron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manga se +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
H	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	24. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	37. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

Units a mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

000223

d 3 copies of completed form to:
ona Department of Health Services
ce of Waste and Water Quality Mgmt.
npliance Section
m 304
5 North Central

Comments:
cc: City of Tombstone

Analysis Date 08/30/89

Analyst S. Hawkins

767304
SPECIMEN NO.

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
SEP 06 1989
ADEQ — OWQ
COMPLIANCE SECTION

08/03/89
DATE REC'D AT LAB

Lab Name & Address — LAB ID NO. 00002

Arizona Testing Laboratories
17[illegible] West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location City of Tombstone Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 07/31/89 Sample Time 10:40 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: Gary A. Lindroos

ADHS Use Only

SC.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	9.7 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Cyanide, Free	,	< 0.01 ,
Silver +	P01077,	. ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Potassium	,	2.8 ,
	,	. ,	Carbonate	,	0 ,
Alkalinity	P00410,	. ,	Bicarbonate	,	220 ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	31 ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	48 ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

000224

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Form 304

Comments:
cc: City of Tombstone

Analysis Date 08/30/89

Analyst S. Hawkins

G[illegible]indwater Quality Protection Pe[illegible]lt

Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

658505
SPECIMEN NO.

06/09/89
DATE REC'D AT LAB

Lab [illegible]e & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location TEI Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 06/07/89 Sample Time 8:50 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

SC.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.013 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chr[illegible]um +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0052 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	2.4 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	< 0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	52. ,		,	. ,
Chloride	P00940,	12. ,		,	. ,
Cop[illegible] +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	14. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.9 ,	Cesium-134[b]	P28414,	. ,
Sodi[illegible]	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = [illegible]ess than the detection limit given

000225

Analysis Date 07/17/89

Analyst [signature]

Comments:

[illegible]end 3 copies of completed form to:
[illegible]izona Department of Health Services
[illegible]ffice of Waste and Water Quality Mgmt.
[illegible]ompliance Section
[illegible]oom 304
[illegible]05 North Central
[illegible]hoenix, Arizona 85004

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

658506
SPECIMEN NO.

06/09/89
DATE REC'D AT LAB

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location TEI Well #2

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 06/07/89 Sample Time 9:15 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019

Collected By: RECEIVED

ADHS Use Only

SC.

JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	< 0.01 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0026 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	0.019 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	25.7 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	0.14 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	100. ,		,	. ,
Chloride	P00940,	48. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	29. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.4 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.
[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

000226

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
205 North Central
Phoenix, Arizona 85004

Comments: _____

Analysis Date 07/17/89

Analyst [signature]

G ındwater Quality Protection Pe lt

Self-Monitoring Report Form
Arizona Department of Health Services

658508
SPECIMEN NO.

RECEIVED 06/09/89
DATE REC'D AT LAB

JUL 1 9 1989
ADEQ — OWQ
COMPLIANCE SECTION

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location PBR Well #4

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 06/07/89 Sample Time 11:30 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

RECEIVED
JUL 1 9 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

SC.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	< 0.01 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
ıromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0050 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	8.7 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	75. ,		,	. ,
Chloride	P00940,	62. ,		,	. ,
›per +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	23. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
	P00403,	8.3 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

ıits are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

000227

Analysis Date 07/17/89

Analyst KAD

Comments:

ınd 3 copies of completed form to:
ızona Department of Health Services
ffice of Waste and Water Quality Mgmt.
ompliance Section
oom 304
05 North Central
oenix, Arizona 85004

65.85 07 (BXV 1/26/90)
SPEC IMEN NO.

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

06/09/89
DATE REC'D AT LAB

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 06/07/89 Sample Time 11:00 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

RECEIVED
JUL 13 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.010 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0097 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	10.1 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	< 0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	76. ,		,	. ,
Chloride	P00940,	36. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	20. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.8 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

000228

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
205 North Central
Phoenix, Arizona 85004

Comments:

Analysis Date 07/17/89

Analyst

Groundwater Quality Protection Permit

Self-Monitoring Report Form
Arizona Department of Health Services

658501
SPECIMEN NO.

RECEIVED 06/09/89
DATE REC'D AT LAB

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-08

Sample Location TEI Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 05/31/89 Sample Time 10:00 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

SC.

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.012 ,	Endrin[a]	P39390,	,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0052 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	2.4 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	< 0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	68. ,		,	. ,
Chloride	P00940,	6. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	14. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.8 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

000229

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
1005 North Central
Phoenix, Arizona 85004

Comments:

Analysis Date 07/17/89

Analyst RJD

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

658502
SPECIMEN NO.

RECEIVED
JUL 19 1989

06/09/89
DATE REC'D AT LAB

ADEQ — OWQ
COMPLIANCE SECTION

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location TEI Well #2

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 05/31/89 Sample Time 10:15 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.011	Endrin[a]	P39390,	
Barium +	P01007,		Lindane[a]	P39782,	
Cadmium +	P01027,		MethoxyChlor[a]	P39480,	
Chromium +	P01034,		Toxaphene[a]	P39400,	
Lead +	P01051,	0.017	2,4-D[a]	P39730,	
Mercury +	P71900,	0.021	2,4,5-TP Silvex[a]	P39045,	
Nitrate(N)	P00620,	26.	TTHM[a]	P82080,	
Selenium +	P01147,				
Silver +	P01077,	< 0.02	Cyanide, Total		0.13
Fluoride	P00951,		Cyanide, Free		< 0.01
Alkalinity	P00410,				
Calcium	P00916,	110.			
Chloride	P00940,	46.			
Copper +	P01042,				
Hardness	P00900,		Radium-226/228[b]	P11503,	
Iron +	P01045,		Gross Alpha, Tot[b]	P01501,	
Magnesium	P00927,	29.	— Count Error[b]	P01502,	
Manganese +	P01055,		Beta Activity[b]	P03501,	
pH	P00403,	7.4	Cesium-134[b]	P28414,	
Sodium	P00929,		Iodine-131[b]	P28301,	
Sulfate	P00945,		Strontium-90/89[b]	P01082,	
TDS	P00500,		Tritium[b]	P82126,	
Zinc +	P01092,		Uranium[b]	P22706,	

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
205 North Central
Phoenix, Arizona 85004

Comments:

000230

Analysis Date 07/17/89

Analyst

G ındwater Quality Protection Pe ıit

Self-Monitoring Report Form
Arizona Department of Health Services

658504
SPECIMEN NO.

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

06/09/89
DATE REC'D AT LAB

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location PBR Well #4

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 05/31/89 Sample Time 2:20 p.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	< 0.01 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	< 0.002 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	8.0 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	81. ,		,	. ,
Chloride	P00940,	64. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	24. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	8.2 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

000231

< = less than the detection limit given

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
205 North Central
Phoenix, Arizona 85004

Comments:

Analysis Date 07/17/89

Analyst

658503
SPECIMEN NO.

G ·undwater Quality Protection Pe··lt

Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
JUL 1 0 1989
ADEQ — OWQ
COMPLIANCE SECTION

06/09/89
DATE REC'D AT LAB

ab ne & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 05/31/89 Sample Time 2:15 p.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

S C .

Parameter Name*	Stored Parameter Number	Laboratory Analysis Results	Parameter Name*	Stored Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.010 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Ch ium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.010 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	9.9 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	0.02 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	0.02 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	74. ,		,	. ,
Chloride	P00940,	34. ,		,	. ,
Cop +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	19. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.7 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

000232

< = less than the detection limit given

nd 3 copies of completed form to:
izona Department of Health Services
fice of Waste and Water Quality Mgmt.
mpliance Section
om 304
5 North Central
oenix, Arizona 85004

Comments:

Analysis Date 07/17/89

Analyst

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

RECEIVED
AUG 09 1989
ADEQ — OWQ
COMPLIANCE SECTION

DATE: August 8, 1989

TO: Dave Woodruff, Manager
Water Pollution Compliance Unit

THRU: Skip Hellerud, Manager
Water Permits Unit

FROM: Roger Kennett, Supervisor
Existing Groundwater Facilities Team

RE: PBR Minerals, Inc. - Grand Central Leaching Facility
Groundwater Quality Protection Permit No. G-0020-02

Attached is a copy of a letter dated July 25, 1989 from Jim Rouse of Geochemical Engineering Incorporated, a consultant for PBR Minerals. Mr. Rouse requests a one-month extension of the interim compliance date for submission of an interpretative aquifer characteristics report required by the compliance schedule of the permit (Part II.E.3; copy attached). In reviewing the compliance file with Louis Parsons, it appears that PBR has not fully complied with items 1 and 2 of the compliance schedule.

I don't feel we should be relaxing an interim compliance date in light of the apparent non-compliance with the two earlier dates. However, we do wish to receive accurate data presented in an appropriate manner. I would recommend sending a letter of warning, requiring the submittal of all required information by no later than August 30, 1989.

I'll be glad to discuss this matter further with you if you so desire.

RK/aa

ADEQ/ADM/Stock (12/88) — IPS 3171

GEOCHEMICAL ENGINEERING
INCORPORATED

WATER PERMITS UNIT

July 25, 1989

Mr. Roger Kennett
Water Permits Unit
Arizona Department of Environmental Quality
2005 N. Central Avenue
Phoenix, Arizona 85004

Dear Roger:

As we discussed in our telephone conversation of 24 July, we have been requested by Mr. J. Michael Ashworth to collect existing data and prepare a geohydrologic evaluation of the PBR Minerals site south of Tombstone. This evaluation is required as a permit condition.

As I stated, as we got into the evaluation, we found that the water levels for the four existing wells indicate a ground-water gradient to the south-southeast, which is counter to the anticipated direction of travel, but consistent with information available in the M.S. thesis by Hollyday, cited in the application. As you know, there is a scarcity of wells in the area.

Since the direction of natural travel is so critical in siting the two other monitoring wells, I want to check on the accuracy of the data and the regional extent of the direction. This will require revisions to the Tombstone well and additional work on the existing wells. For that reason, I would like to request a one-month extension to the time requirement for the geohydrologic report.

I have tabulated the recent chemical data on the various wells available for sampling. As I stated, Well TEI-3 reportedly experienced structural failure. Santa Fe Minerals has drilled a replacement; however, this is not available for routine monitoring. In like fashion, another well (shown as No. 25 on our application) is known to exist to the south; however, it is indicated that we cannot gain access to this well.

274 UNION BLVD., SUITE 460 LAKEWOOD, COLORADO 80228 (303) 988-8902

A brief analysis of the data on PBR Well No. 4 indicates that the southerly migration is consistent with the chemistry. We will better be able to evaluate this after we receive major ion data on all the wells, but the present data certainly seems to support the southerly migration.

Thanks for your consideration, and I look forward to working with you.

Very truly yours,

Jim V. Rouse, R.G.

JVR/lw

cc: J. Michael Ashworth

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - TEI Well #1
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic	NA	0.012	0.013
Lead	NA	0.0052	0.0052
Mercury	<0.001	<0.001	<0.001
Nitrate	1.9	2.4	2.4
Silver	NA	<0.02	<0.02
Calcium	NA	68	52
Chloride	NA	6	12
Magnesium	NA	14	14
pH-S.U.	NA	7.8	7.9
Total CN	<0.01	<0.01	<0.01
Free CN	<0.01	<0.01	<0.01

NA = Not Analyzed

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - TEI Well #2
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic	NA	0.011	<0.01
Lead	NA	0.017	0.0026
Mercury	0.023	0.021	0.019
Nitrate	27.1	26	25.7
Silver	NA	<0.02	<0.02
Calcium	NA	110	100
Chloride	NA	46	48
Magnesium	NA	29	29
pH-S.V.	NA	7.4	7.4
Total CN	0.11	0.13	0.14
Free CN	0.01	<0.01	0.01

NA = not analyzed

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - PBR Well #4
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic		<0.01	<0.01
Lead	Well not constructed this date	<0.002	0.0050
Mercury		<0.001	<0.001
Nitrate		8.0	8.7
Silver		<0.02	<0.02
Calcium		81	75
Chloride		64	62
Magnesium		24	23
pH-S.U.		8.2	8.3
Total CN		0.01	0.01
Free CN		0.01	0.01

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - Tombstone City Well
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic	NA	0.010	0.010
Lead	NA	0.010	0.0097
Mercury	<0.001	<0.001	<0.001
Nitrate	7.5	9.9	10.1
Silver	NA	<0.02	<0.02
Calcium	NA	74	76
Chloride	NA	34	36
Magnesium	NA	19	20
pH-S.U.	NA	7.7	7.8
Total CN	<0.01	0.02	<0.01
Free CN	<0.01	0.02	<0.01

NA = Not Analyzed

Permit issued 1/20/89

e. Allow solutions to evaporate from the ponds. Any remaining residues or sludges shall be analyzed by EPA approved test methods (Test Methods for Evaluating Solid Waste, SW-846, 2nd Edition) for the following constituents, and the results reported to the Department:

Constituent	Limits
Cyanide (Total and Free)	10 mg/l
Arsenic	5 mg/l
Barium	100 mg/l
Cadmium	1 mg/l
Chromium	5 mg/l
Lead	5 mg/l
Selenium	1 mg/l
Silver	5 mg/l

If any constituent exceeds its associated limit, the residual sludge shall be removed and disposed of at a landfill approved for handling hazardous waste.

2. The permittee shall file a report with the Department's Water Permits Unit following closure describing the results of each step of the closure plan within 60 days after closure.

E. Compliance Schedule (R9-20-219)

The permittee shall complete a site assessment and develop a closure report for the remediation of TEI Well #2 addressing whether groundwater quality standards will be maintained at the downgradient property boundary. Monthly monitoring of TEI #1, #2 and #3 groundwater wells shall be for the following constituents: NO_3-N, CN (total and free) and Hg until the Director deems necessary based on review and approval of the site assessment and closure report.

The tasks of the site assessment and submittal of the closure report shall be performed in accordance with the following schedule of compliance:

The permittee shall submit reports of compliance or noncompliance with the interim requirements of the compliance schedule within 14 days following each interim date.

1. Prior to Leaching Operations

Install the downgradient pumping monitor well and collect three (3) rounds of ambient groundwater samples for analysis of constituents listed in PART II.B.1.e. so that MGL's and Alert Levels can be established prior to initiation of the facility's leaching operation.

2. Three (3) Months from Permit Issuance

   Complete aquifer testing (pump test) of TEI Well #2. Submit historical pumping records for TEI Well #2.

3. Six (6) Months from Permit Issuance

   Submit to the Department an interpretative aquifer characteristics report including:

   a. Water Table map showing groundwater flow directions with groundwater contour elevations;

   b. aquifer testing results for TEI Well #2;

   c. water quality data for all on-site groundwater wells since the issuance of this permit; and

   d. proposed locations for additional groundwater monitoring wells (minimum of two (2)).

4. Nine (9) Months from Permit Issuance

   The installations of additional monitor wells shall be completed. Submit to the Department the driller's logs for each of the wells completed and groundwater quality data for each of these wells.

5. Twelve (12) Months from Permit Issuance

   Submit a closure report addressing all remedial activities and any further actions needed to establish compliance with this permit.

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

DATE: August 16, 1989

TO: David Woodruff, P.E.
Manager, Water Pollution Compliance Unit

THRU: James A. Maston, P.E.
Manager, Southern Regional Office

FROM: Andrew M. Rendes
Southern Regional Office

RECEIVED
AUG 22 1989
ADEQ — OWQ
COMPLIANCE SECTION

RE: PBR Minerals, Inc. - Permit G-0020-02

On Monday, July 31, 1989, a site visit was made to the above referenced property by James Dubois and this writer for the purpose of taking water samples from the PBR Minerals property wells and leak detection system. In addition, water samples were to be taken at the three City of Tombstone water wells and the million-gallon reservoir. The request for the compliance inspection was received in the office the day after the sampling trip.

At the time of the sampling, the mining facility was not mining or processing any material. It was operationally shut down even though personnel were working.

As observed, PBR Minerals, Inc. is in compliance with G-0020-02 as written, with some minor exceptions. The containment/disposal requirements are as in the permit [part II A. 1.a, b., c., d., e., f.] the chemical storage [II A.1.g.] was not evaluated.

The T.E.I. wells No. 1 and No. 2 were sampled. T.E.I. well No. 3 was inoperable due to collapse. A new well was drilled in close proximity for Santa Fe Minerals, and their permission is necessary for the use or operation of the well. One of the monitoring wells called for has been completed, known as T.E.I. No. 4. PBR Minerals brings up a portable generator when they need to pump/sample as there is not yet a permanent power source at the well. The well is located on the hill to the North of the leaching pads. According to Mr. Gary Lindross, of PBR Minerals, the well has been tested and results submitted to Phoenix.

A practice of PBR Minerals that needs correcting is that the ends of the leak detection sampling pipes are uncovered, i.e., left exposed to the elements. During precipitation events, there currently is nothing to prevent rainfall from entering the leak detection system.

As stated at the outset, the request for the compliance inspection was received the day after the sampling trip. For that reason, not every facet and provision in the Groundwater Quality Protection Permit was evaluated. However, what was observed during the facility tour appears to meet with the intent of G-002-02. Two additional monitor wells need to be drilled, and the ends of the leak detection sampling tubes need to be covered.

JAM:AMR:as

ADEQ/ADM/Stock (Rev. 4-87)

Jim 8/11/89

Cyanide	Bubose ~~B~~BR Well	#1	.049
		#2	.115
		#2	.114
	Tombstone	#1	.052
		#1	.052
		#2	.023
		#3	.027
	Res.		<0.020

Guidance ~~.022~~ 0.22 level

Permit 0.20 mg/l

G 0020-02
GWQ PP -

GEOCHEMICAL ENGINEERING
INCORPORATED

AUG 1989
RECEIVED
WATER PERMITS UNIT

August 21, 1989

Mr. Roger Kennett
Water Permits Unit
Arizona Department of Environmental
Quality
2005 N. Central Avenue
Phoenix, AZ 85004

FEDERAL EXPRESS

Re: PBR Minerals Aquifer Characteristics Reports

Dear Roger:

As we discussed in our telephone conversation of July 24, 1989, Mr. J. Michael Ashworth has requested that I prepare an aquifer characteristics report, as required as a condition of the PBR Minerals permit. This letter will serve as a vehicle for furnishing the required, available data. The information items required by the permit are arranged in the same order as the requirements of the permit. For a more complete picture of overall geohydrologic conditions, I refer you to our earlier report "Geohydrologic Assessment of Cyanide Contamination of PBR Minerals Well No. 2, Tombstone, Cochise County, Arizona", a copy of which is included.

WATER TABLE EVALUATIONS

As I described during our conversation, plant personnel have modified the well equipment to allow for water-level information in wells TEI-#1, #2, and #4, as well as arranging for water-level determination in the Tombstone well. Well TEI-3 has reportedly been destroyed and replaced by another well by Santa Fe Minerals, the operator of that property. The well is thus not routinely available for monitoring.

Site personnel have checked back through old records and located depth to water data obtained from TEI wells #1 and #2 and the Tombstone well on May 18, 1987. They have also made a series of recent water level determinations in the available wells. The 1987 and 1989 data are tabulated in Table 1. The 1989 data were utilized in the preparation of a water-table map, figure 1. They reflect non-pumping water levels, and confirm that the ground-water

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gradient is to the south across the PBR site. While the 1987 data indicate a gradient from the Tombstone well across the PBR site, this is reversed for the 1989 data. This likely reflects summertime pumpage of the Tombstone well. The southern gradient is consistent with a southern gradient south of Stockton Hill east of Tombstone, shown on Plate 1 of Hollyday (1963).

As I mentioned in our June conversation, the data indicates that there cannot realistically be a connection between contamination of Well No. 2 and any water quality problems in the Tombstone well, and explains why no cyanide has been detected in TEI No. 1. As will be discussed later, the chemical data for the various wells agree with this trend.

AQUIFER TESTING RESULTS

As you were advised by a May 1, 1989 letter from Mr. Gary Lindroos, Farmers Pumps Co. conducted a test of TEI Well No. 2 on April 20, 1989. We have requested data from this test, but Farmers Pump Co. has not complied. In the absence of information on that test, site personnel have completed a second test, using a protocol I provided. Table 2 provides data on the test while Figure 2 is a time-series plot of the data. As you can see, there was an initial semi-log drawdown, with a shift of the drawdown as a result of a brief decrease in flow. After 85 minutes of pumping, the cone of depression intersected a recharge boundary, likely an open, water-filled mine void.

The initial drawdown was used to calculate the transmissivity of adjacent rocks using this formula:

$$T = \frac{264\ Q}{\Delta\ s} = 2200 \text{ gpd/ft.}$$

This is approximately 20 percent of the value calculated by Hollyday using shaft dewatering data, which seems reasonable considering the different type of conditions in the different tests.

WATER QUALITY DATA

Tables 3A through 3D include 1989 water quality data for available site wells. As you will note, water quality data for PBR No. 4 include detectable cyanide, and elevated nitrate values. This would seem consistent with a south ground-water gradient. I have requested that samples collected during August, 1989 be analyzed for major ions, to allow use of the trilinear plot technique. As shown in the enclosed Geohydrologic Assessment, Well No. 2 has a "fingerprint" different than Well No. 1. The samples will be useful to prove/disprove the indicated southerly migration.

PROPOSED WELL LOCATIONS

The date collected to date indicate that the present well is likely upgradient of the new facilities. Thus, the two new wells should be located south of the leach pad and plant. Because of the proximity of indicated underground workings, it is proposed that one well be constructed at the southwest corner of the facilities, and the second well be approximately at the mid-point of the southern site boundary. Site personnel indicate that the present PBR #4 pumps dry after 4 to 5 hours of pumping. Since this well is upgradient and has to create a cone of depression to monitor the facility, I recommend that one of the other wells (likely the southwestern one) be designated as the pumped monitor well. As state, it is anticipated that this location will be in or near old underground workings.

I trust the above information is satisfactory. I will forward the trilinear plots and an interpretive report as soon as I receive the lab reports on the August samples.

Very truly yours,

GEOCHEMICAL ENGINEERING, INC.

Jim V. Rouse, R.G.
Director of Geohydrology

JVR/cdv
Enclosures

cc: J. Michael Ashworth
Gary A. Lindroos

Table 1
Measured Depths to Water and Calculated Water-Table Evaluations,
May, 1987 and July-August, 1989

Well Identification	TEI #1	TEI #2	Santa Fe #3	PBR #4	Tombstone
Measurement Point Elev.	4578	4570	4615	4745	4560
Map ID No.	24	23	22	4	21
Depth to Water, 5/87	518	527	----	----	404
Water Table Elev. 5/87	4060	4043	----	----	4156
Depth to Water 7/8/89	386	467	430	685	410
Water Table Elev. 5/87	4192	4103	4185	4060	4150

Table 2
Aquifer Test Data, TEI Well No. 2
August 16 - 21, 1989

Date, 1989	Time	Time from start, min.	Flow GPM	Depth to water, ft.	Drawdown ft.	Remarks
16 Aug.	10:00	0	0	466.11	0	
	10:05	5	62.5	467.26	1.15	
	10:10	10	65.6	469.58	3.47	
	10:15	15	64.4	470.73	4.62	
	10:30	30	65.1	470.73	4.62	
	10:45	45	65.0	471.89	5.78	
	11:00	60	65.0	473.04	6.93	
	12:00	120	65.1	474.20	8.09	
	13:00	180	64.8	474.20	8.09	
	14:00	240	65.0	474.20	8.09	
21 Aug.	10:30	7230	65.5	475.35	9.24	

Table 3-A

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - TEI Well #1
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic	NA	0.012	0.013
Lead	NA	0.0052	0.0052
Mercury	<0.001	<0.001	<0.001
Nitrate	1.9	2.4	2.4
Silver	NA	<0.02	<0.02
Calcium	NA	68	52
Chloride	NA	6	12
Magnesium	NA	14	14
pH-S.U.	NA	7.8	7.9
Total CN	<0.01	<0.01	<0.01
Free CN	<0.01	<0.01	<0.01

NA = Not Analyzed

Table 3-B

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - TEI Well #2
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic	NA	0.011	<0.01
Lead	NA	0.017	0.0026
Mercury	0.023	0.021	0.019
Nitrate	27.1	26	25.7
Silver	NA	<0.02	<0.02
Calcium	NA	110	100
Chloride	NA	46	48
Magnesium	NA	29	29
pH-S.V.	NA	7.4	7.4
Total CN	0.11	0.13	0.14
Free CN	0.01	<0.01	0.01

NA = not analyzed

Table 3-C

Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - PBR Well #4
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic		<0.01	<0.01
Lead	Well not constructed this date	<0.002	0.0050
Mercury		<0.001	<0.001
Nitrate		8.0	8.7
Silver		<0.02	<0.02
Calcium		81	75
Chloride		64	62
Magnesium		24	23
pH-S.U.		8.2	8.3
Total CN		0.01	0.01
Free CN		0.01	0.01

Table 3-D
Cowichan Resources, Inc.
1989 Ground-Water Monitoring Results

Tombstone, Arizona
Well I.D. - Tombstone City Well
(Results in mg/l unless noted)

Date, 1989 Lab	Jan. 12 Smith & Smith	May 31 Ariz. Testing	June 7 Ariz. Testing
Arsenic	NA	0.010	0.010
Lead	NA	0.010	0.0097
Mercury	<0.001	<0.001	<0.001
Nitrate	7.5	9.9	10.1
Silver	NA	<0.02	<0.02
Calcium	NA	74	76
Chloride	NA	34	36
Magnesium	NA	19	20
pH-S.U.	NA	7.7	7.8
Total CN	<0.01	0.02	<0.01
Free CN	<0.01	0.02	<0.01

NA = Not Analyzed

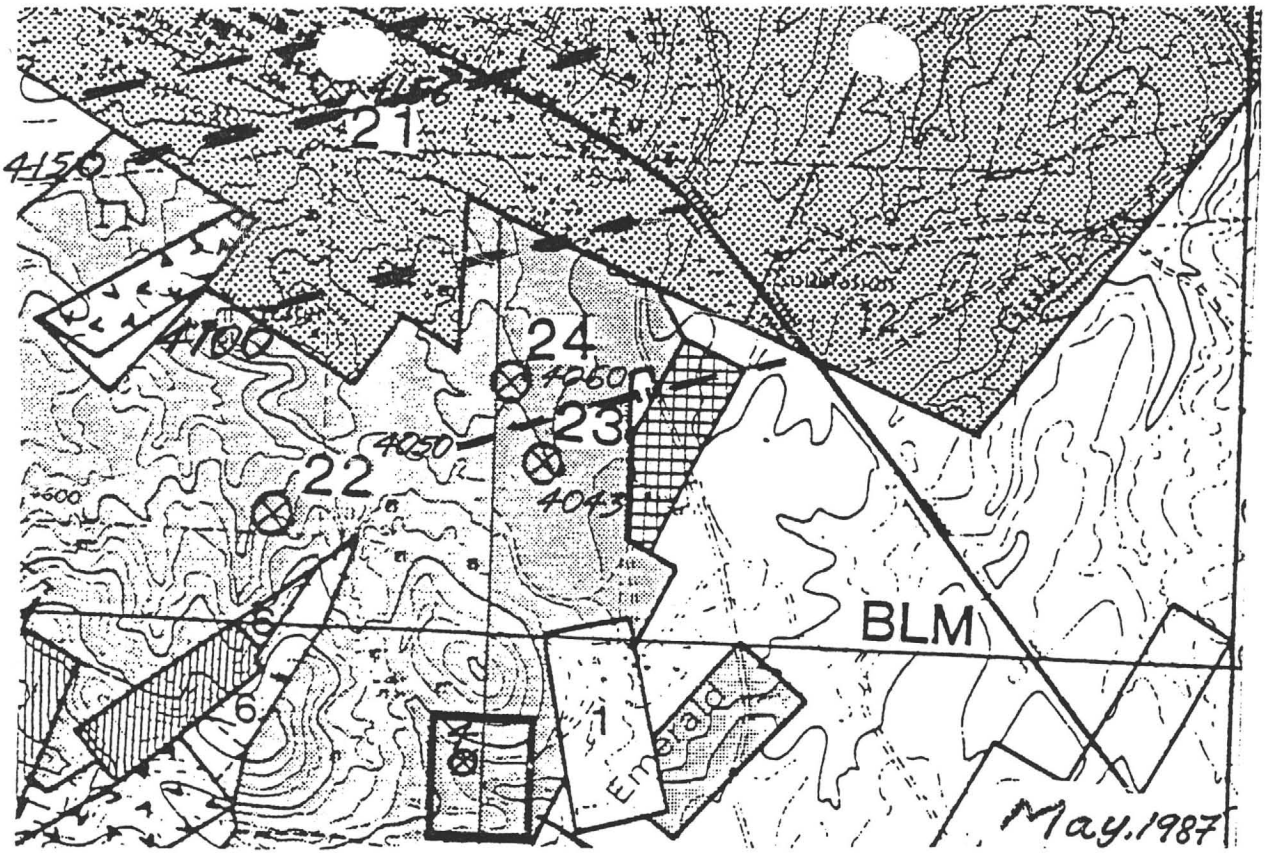
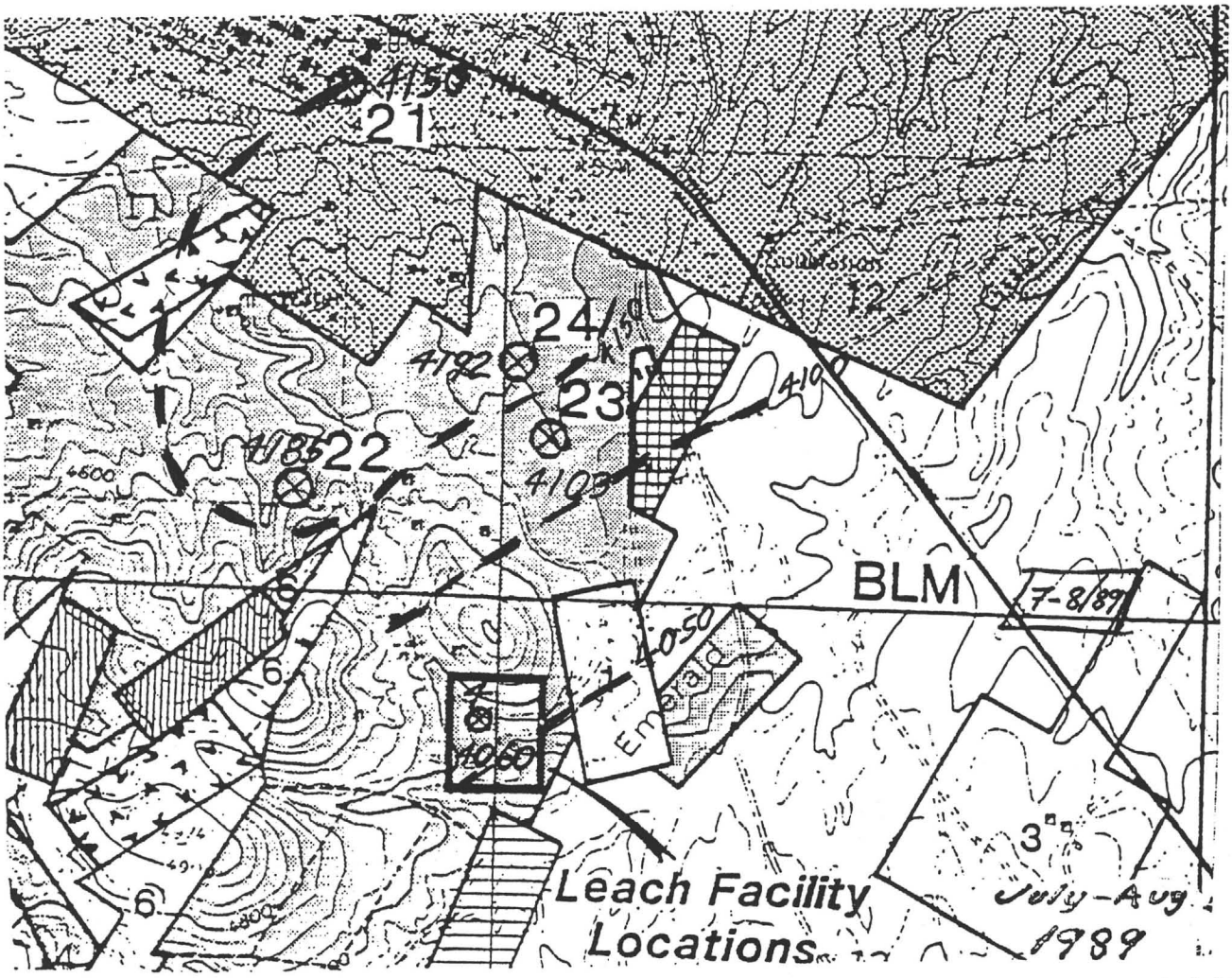


Figure 1 Water Table Map, May, 1987 and July-August, 1989



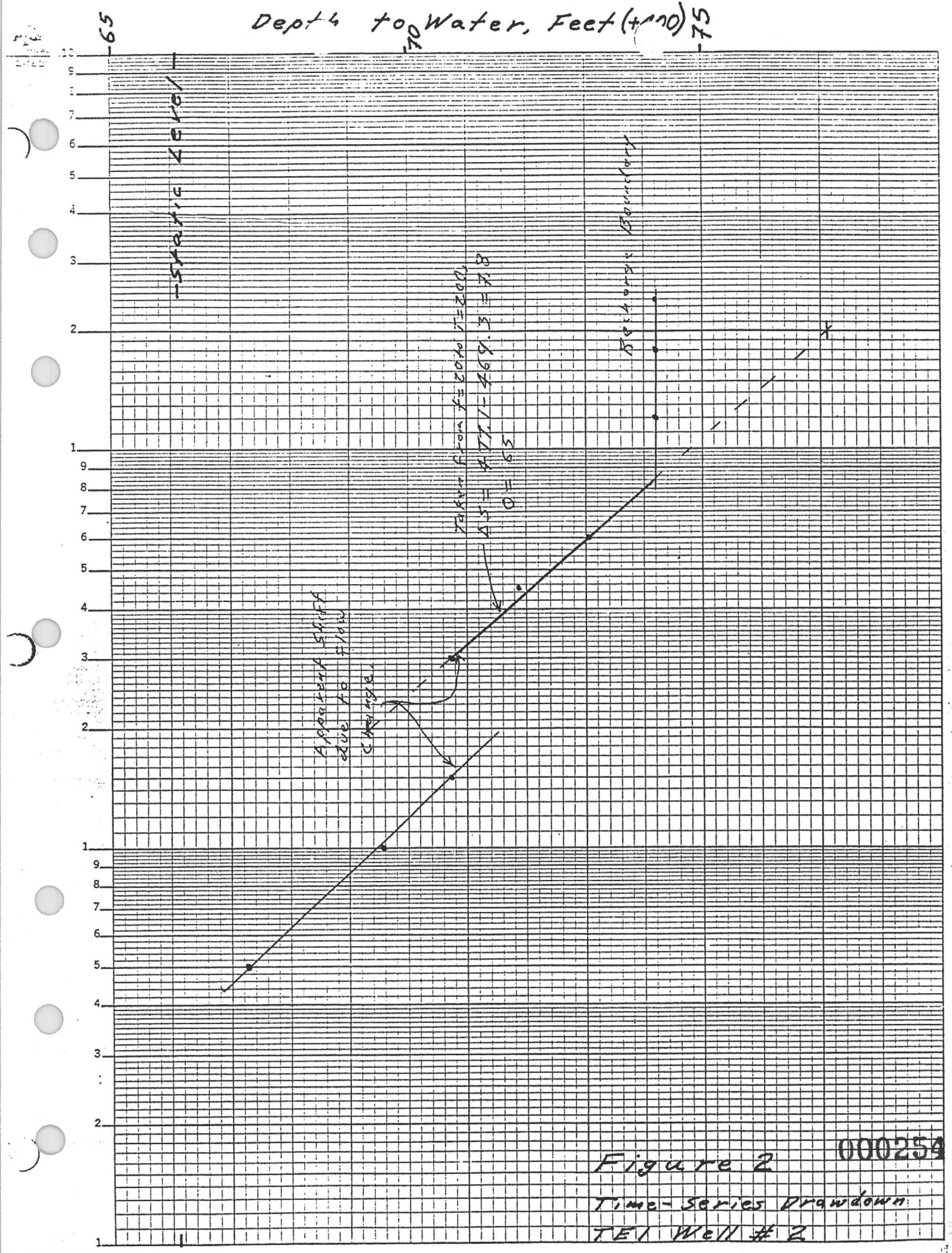


Figure 2

Time-Series Drawdown

TEI Well #2

000259

Semi-Logarithmic
3 Cycles x 10 to the inch

Geohydrologic Assessment of Cyanide Contamination of PBR Minerals Well No. 2 Tombstone, Cochise County, Arizona

Prepared For

PBR Minerals, Inc.
Tombstone, Arizona

By

Geochemical Engineering, Inc.
Denver, Colorado

1.0 INTRODUCTION

PBR Minerals, Inc. is currently involved in the cleanup of soil cyanide contamination resulting from precious-metal recovery efforts by the prior site occupant. Water-quality monitoring by the previous occupant (TEI) indicated the presence of cyanide in Well No. 2 (Arizona Registration No. 55-516482, located at D-22-20-12ccd), but the absence of similar cyanide in Wells Nos. 1 and 3 (Arizona Registration Nos. 55-505610 and 55-086448.) The Arizona Department of Environmental Quality requested PBR Minerals, Inc. to conduct a geohydrologic evaluation of the source and methods of control of the ground-water contamination in Well No. 2. Specifically, the request was for a description of

> "procedures for performing a demonstration that the source of contamination of TEI #2 has been removed, and all further migration of cyanide and nitrate will not occur in ground-water quality concentrations which would violate standards off site, or affect downgradient users."

In response to this request, PBR requested Geochemical Engineering, Inc. (GEI) to evaluate the geohydrology of the area, and to assess the source of the cyanide (and related nitrate) contamination of Well No. 2. As described in a subsequent section, events during surficial material cleanup provided rather dramatic evidence of the source and pathway of the contamination, in the form of a breakthrough into a previously-unknown mine raise under the disposal pond area.

2.0 SITE HYDROLOGY

The site hydrology in the PBR Minerals area has been well described by Hollyday (1963). The following description is adapted from this source, together with modifications resulting from more recent drilling activities and excavations conducted by PBR Minerals and its predecessors.

2.1 Geology

The geology of the Tombstone Mining District has been examined in detail with respect to both general and economic geology. One of the first studies of the general geology and ore occurrence was prepared by W. P. Blake (1882) in response to mine litigation. Blake subsequently published additional general reviews of geology and mining development in 1902 and 1904. J. A. Church (1903) published a report on the regional occurrence of ore deposits and the general geology, which incorporated local stratigraphic names.

Dr. F. L. Ransome (1920) published a comprehensive study of the geology of the surface and subsurface of the Tombstone Mining District, and introduced the type stratigraphic names as utilized in the Bisbee District. This work was continued and carried to completion by B. S. Butler, E. D. Wilson and C. A. Rasor (1938) in a description of the geology and the occurrence of ore in the central portion of the Tombstone Mining District.

James Gilluly, J. R. Cooper and J. S. Williams (1954) conducted a detailed study of the Pennsylvanian-Permian stratigraphy in the adjacent Tombstone Hills, and upgraded Ransome's Naco Formation into a Group, which they subdivided into four formations. Gilluly subsequently conducted a regional study of the stratigraphy and structure in the Tombstone Hills, Dragoon Mountains and the northern half of the Mule Mountains (1956).

2.1.1 Surficial Geology

Soils within the PBR Minerals area are generally thin and discontinuous, and are formed by the in-place weathering of bedrock which occurs at or very near the land surface. Soils tend to be rather coarse-grained in nature, reflecting such mechanical weathering, and are generally of low plant productivity.

Alluvium occurs in the northeastern corner of the Tombstone Mining District, and is largely composed of coarse sand and gravel, which in many locations is cemented with caliche deposits to depths as great as 90 feet (Hollyday, 1963). The alluvium thickens to the northeast and east of the town. Here, the upper 30 to 90 feet of alluvium is predominately composed of limestone pebbles and cobbles derived from Paleozoic carbonates and cemented with caliche. Below this layer, the alluvium is unconsolidated to moderately well-indurated gravel

composed of fragments derived from shales and sandstones of the Bisbee Formation. This gravel has a maximum thickness of between 45 and 120 feet. The lowest portion of the alluvium consists of a gravel layer which is unconsolidated to weakly cemented, with a maximum known thickness of 300 feet. This lower-most layer is primarily composed of a mixture of gravel and sand derived from the Bisbee Formation and from quartz latite volcanics. A well, drilled approximately one mile east of Tombstone, encountered the water table in the alluvium at a depth of approximately 455 feet, but caved before it could be pumped to determine the water-bearing properties of the alluvium. Hollyday (1963) presents information that indicates the water table in the alluvium is interconnected with the water table in consolidated bedrock, where the alluvium receives sufficient recharge to be saturated. Alluvium is absent or only rarely present in the PBR Minerals site.

2.1.2 Subsurface Geology

The Tombstone Mining District is underlain by a thick sequence of intrusive rocks and Precambrian metamorphics, Paleozoic clastics, Paleozoic carbonates, the Bisbee formation and volcanic rocks.

Intrusive and Metamorphic Rocks: As noted by Hollyday (1963) "the intrusive rocks and Precambrian metamorphic rocks consist of three generalized geologic formations: Precambrian intrusive and metamorphic rocks, Triassic-Jurasic intrusive rocks, and Tertiary intrusive rocks." The Precambrian intrusives consist of albite granite, quartz diorite, gneissic granite, and saussuritic quartz diorite. In general, these rocks are highly fractured, altered and weathered, with the fractures sealed with clay-sized weathering products. As a result, they yield small quantities of water only within the first few tens of feet below the water table (Hollyday, 1963).

The Triassic and Jurasic intrusive rocks occur in the western portions of the Mule Mountains and along the core and southern portion of the Dragoon Mountains. These are predominately quartz monzonite and granite which have been intensely altered and sheared. As in the case of the Precambrian rocks, they are generally quite impermeable below the first few tens of feet.

The Tertiary intrusive rocks outcrop in the northern and western portions of the Tombstone Hills and in the northern portion of the Dragoon Mountains. These intrusives are intermediate in composition, similar to quartz monzonite. The Schieffelin Granodiorite found in the western portion of the Tombstone Mining District is characterized by an irregularly-spaced, three-directional fracture system which stores small quantities of water. Shallow dug wells along Tombstone Gulch furnished water for the town of Tombstone during the first two years of its existence, and derived such water from fractures within the Schieffelin Granodiorite. Dewatering activities in the rocks east of the Schieffelin Granodiorite did not result in change in water level within the granodiorite, thereby documenting that the

Schieffelin Granodiorite is not hydrologically connected with consolidated rocks to the east.

Dikes of granodiorite to diorite composition, similar to the Schieffelin Granodiorite in origin, cross the Tombstone Mining District along a trend of North 12 degrees East and dip steeply to the west.

Paleozoic Clastic Rocks: The Bolsa Quartzite of middle Cambrian age is predominately composed of well indurated quartzite derived from quartzitic pebble grit and coarse sand, with a thin basal conglomerate. It crops out in the Tombstone Mining District, along the western edge of the Mule Mountains, and in the core of the Dragoon Mountains. Hollyday (1963) reported a 440 foot thick homogeneous aquifer in the Bolsa Quartzite as a result of numerous joints and fractures. The Bolsa Quartzite is one of the best crystaline-rock aquifers within the Tombstone Mining District.

Paleozoic Carbonates: The various Paleozoic carbonate formations in the area are generally undifferentiated in the following discussion. These Paleozoic carbonates include the Abrigo Limestone, the Martin Limestone, the Escabrosa Limestone and the four local formations in the Naco Group; the Horquilla Limestone, the Earp Formation, the Colina Limestone and the Epitaph Dolomite. The composite thickness of these Paleozoic carbonates is approximately 5,200 feet, of which approximately 13% or 660 feet consist of partly siliceous material metamorphosed to hornfels near younger intrusive rocks. Such hornfelsic material yields moderately large quantities of water. The remaining 4,540 feet of non-siliceous material in the Paleozoic carbonate sequence is composed of predominately limestone with subordinate amounts of nodular chert, dolomite and calcarious shale. Fractures in the carbonate material have generally been enlarged by solution cavity development above and to a depth of 200 to 300 feet below the water table.

Bisbee Formation: The Bisbee Formation of Cretaceous age outcrops in the central portion of the Tombstone Mining District and the Tombstone Hills. It also underlies most of the northern half of the Mule Mountains and the eastern portion of the Dragoon Mountains. The Bisbee Formation, within the Tombstone Mining District, is subdivided into three generalized geologic units: Bisbee Formation clastics, Blue Limestone and Joe Limestone. The Bisbee Formation has a composite thickness of approximately 3,000 feet, of which approximately 160 feet is limestone. The lowermost clastic rocks at the base of the Bisbee Formation are locally known as "novaculite", and unconformably overlie the Epitaph Dolomite, ranging in thickness between 55 and 125 feet. The "novaculite" is an interbedded sequence of limestone fragments in a quartzitic sand matrix, sandy limestone, calcarious shale and chert. The "novaculite" has been altered to extremely hard and brittle hornfels.

The "novaculite" is conformably overlain by the Blue Limestone. It is a medium to thin-bedded silty limestone ranging in thickness between 20 and 40 feet. The Blue Limestone has generally been subjected to extreme solutioning above the present water table prior to deposition of silver ores.

The Joe Limestone is a cherty limestone of approximately 20 feet thickness. Numerous fissures and faults within the Bisbee Formation have been accompanied by strong zones of shattering. These zones give the Bisbee Formation clastics relatively high porosity and permeablity, as compared with the Paleozoic carbonates.

Volcanic Rocks: Two ages of volcanics occur within the Tombstone District. The Cretaceous-Tertiary volcanics outcrop along the San Pedro River, southwest of the Tombstone Hills. These are composed of andesite and quartz latite, and have been intruded and broken by younger rocks. The upper quartz latite member contains water-deposited tuff beds, with a total thickness of Cretaceous-Tertiary volcanics of approximately 6,000 feet.

Tertiary-Quarternary volcanics outcrop in the area of Stockton Hill, between the Tombstone Hills and the southern part of the Dragoon Mountains. These volcanics are predominately latite tuff and rhyolite tuff, together with flows of hornblend andesite. A small plug-shaped mass of olivine basalt occurs within valley alluvium approximately three-quarters of a mile northeast of Tombstone. These volcanics supplied much of the detrital material forming the alluvium in the valley northeast of Tombstone.

2.1.3 Structure

Geologic structure within the Tombstone Mining District has an appreciable impact on the hydrologic conditions within the area. Four major structural elements have been identified, and are designated the Tombstone Syncline, the Schieffelin Dome, the Ajax Hill Horst and the Tombstone Alluvial Basin.

Tombstone Syncline: The central portion of the Tombstone Mining District lies in a broad, asymetrical synclinal basin which plunges to the southeast. Three minor folds bring Paleozoic carbonate rocks to the surface. The syncline has resulted in the presence of a thick section of clastic rocks, thereby producing a potential storage reservoir for ground water. Clastic rocks thicken to the east southeast, as a result of the synclinal plunge.

The synclinal basin is traversed by at least eight major fissures, trending approximately North 45 degrees East and dipping steeply to the southeast. The fissures have been widened by solution activity above the water table and for a distance below the water table, and thus may impart a strong preferential orientation to the permeability of rocks within mine workings.

The synclinal basin is also traversed by a set of normal faults trending North 10 to 15 degrees East, and by a minor set of normal faults at approximately right angles to these faults. The faults apparently are relatively open channelways for water circulation at depths greater than 400 feet below the water table (Hollyday, 1963).

The Tombstone Syncline is bounded on the west by the Schieffelin Dome, a granodiorite intrusive which plunges below the Tombstone Syncline at an angle of approximately 60 degrees (Hollyday, 1963). As noted earlier, the Schieffelin Dome acts as a barrier to ground-water circulation west of the Tombstone Syncline.

Ajax Hill Horst: The Tombstone Syncline is bounded on the south by the Ajax Hill Horst. These two features were formed by reverse movement on the Prompter Fault, with a maximum stratigraphic displacement of approximately 4,000 feet. Paleozoic carbonate rocks in the vicinity of the Emerald Mine dip 50 to 60 degrees east. The Prompter Fault and its associated branches uplift relatively impermeable Precambrian albite granite which continue the impermeable hydrologic boundary formed by the Schieffelin Granodiorite.

Tombstone Alluvial Basin: The Tombstone Syncline is bounded on the north and northeast by the Tombstone Alluvial Basin. Water in the alluvial deposits occur at a distance of approximately 1,500 feet east of the northeast corner of the Tombstone Mining District. Such alluvial water forms an important source of recharge to mine rocks during heavy pumping operations.

2.2 Hydrology

Hydrology of the Tombstone Mining District has been extensively studied and reported by Hollyday (1963). The following discussion is largely taken from that source.

2.2.1 Surface Water

Surface water does not exist in the Tombstone Mining District except during and immediately after periods of intense precipitation. The closest perennial stream to the Tombstone Mining District is the San Pedro River, a northerly-flowing stream located approximately six miles to the west of Tombstone.

2.2.2 Ground-Water Occurrence and Movement

Interest has long centered on ground-water conditions in the Tombstone area as a result of the problems presented to mining operations by the presence of large quantities of ground water. W. F. Staunton first reviewed the dewatering records of previous mining companies in order to estimate the requisite capacity of a new pumping plant. Staunton explained the reasoning behind his estimate in a 1908 paper and reviewed the accidental flooding of the mines, the then-existing pumping plant and problems associated with regaining the 1,000-foot

level in an article published in 1910. E. W. Walker (1908) also described the Tombstone Pumping Plant and some of the dewatering problems. J. A. Church (1905) investigated the water problems in the district and published hypotheses as to the source and movement of water and its potential for control. Charles LeGrand (1914) reviewed existing pumping and provided an estimate of contemporary cost of dewatering. R. B. Brinsmade (1906, 1907) reported on the method used for sinking wet shafts and proposed suggestions with respect to the source of the water. He also reported on progress in handling water problems at the Tombstone Mining District. By far the most complete description of hydrologic conditions in the area has been provided by Hollyday (1963).

Ground water occurs under both fissure occurrence in fractured consolidated rocks and as interstitial water in alluvium. The alluvial reservoir is located north of the Tombstone Mining District. Minor perched water occurs in local deposits of alluvium along desert washes immediately following precipitation events.

The consolidated-rock aquifer consists of water-filled minute fractures, larger fissures and major solution openings, where metamorphism and structural deformation have developed large secondary permeability within the rocks. In the Tombstone Mining District this consolidated rock reservoir is encountered in all but the extreme western part of the district. Static water levels are found at depths ranging from 400 to 600 feet below land surface. The bulk of this ground-water reservoir is contained within the upper 300 feet of saturated rock (Hollyday, 1963). Below this depth, fissures and fractures decrease in open space, and solution cavities become almost non-existent. Recharge to the consolidated rock ground-water mass occurs by infiltration of precipitation through highly-fractured zones in the bedrock of the mountains and through alluvial recharge along washes in the valley areas. Water in the ground-water reservoir moves slowly down gradient, away from the mountain front, toward the San Pedro River and Whitewater Draw. The direction of ground-water flow within the Tombstone District is generally to the north in areas south of the city and to the west in areas north and east of the city. Discharge is as seepage outflow to the San Pedro River and as transpiration by phrentophytes in the river valley and along Whitewater Draw.

Hollyday (1963) has divided the Tombstone Mining District into four generalized hydrogeologic regions. The region of greatest yield and least drawdown is located to the northeast of Tombstone, in the area of valley alluvium which is, in turn, underlain by the Bisbee Formation. Region 2, including the PBR Minerals site, is the area of next highest yield, but is characterized by a greater specific drawdown. This region contains the thicker portions of the Bisbee Formation clastic rocks. Region 3 is the area of lowest yield and greatest drawdown within the mining district, and is underlain by predominately carbonate rocks adjacent to the impermeable Schieffelin Dome and Ajax Hill Horst. Region 4 is characterized by the Schieffelin Dome west of

the Tombstone Syncline and the impermeable albite granites in the western part of the Ajax Hill Horst.

Ground-water development in the Tombstone Mining District has dealt primarily with efforts at dewatering, to allow deep mining. These efforts included empirical testing to estimate dewatering capability, along with the provision of water for milling operations. Only minor water development has occurred for municipal use.

The first known discovery of water was made in the Sulphuret Shaft in March, 1881 at an elevation of approximately 4,110 feet. The Sulphuret Shaft is immediately adjacent to the present open cut which was operated by the PBR Minerals predecessors. In April, 1882, the Grand Central Shaft encountered water at approximately the same elevation as that in the Sulphuret Shaft. Water was encountered at an elevation approximately the same in the Contention Shaft and the Head Center Shaft in the winter of 1882. The Emerald Shaft, located south of the main mining district, encountered water in 1988 at an elevation of approximately 4,090 feet, after the first efforts at pumping and dewatering had been in place. All these shafts are now within or immediately adjacent to the large open pit on the PBR Minerals site.

The first major efforts at dewatering were installed by the Grand Central Company during 1883, with a capacity of approximately 0.5 million gallons per day combined capacity. These pumps proved inadequate to lower the water to a significant depth, so an additional capacity of 1.5 million gallons per day was installed. At approximately the same time, the Contention Company installed an additional capacity of 1 million gallons per day. The two main companies were thus able to lower the water table approximately 100 to 130 feet during 20 months of pumping between May, 1884 and May, 1886 (Hollyday, 1963). By April, 1886, water had been encountered in the West Side workings in the northern part of the district, at an elevation of approximately 4,116 feet, and an average withdrawal of 153 gallons per minute resulted in an 11-foot drawdown. Water from the West Side workings were used for supply in the Girard Mill. During 1890 water was encountered in a winz at the bottom of the Lucky Cuss workings at an elevation of 4,110 feet. Dewatering at this site by means of pneumatic pumps and iron bailers succeeded in lowering the water table approximately 100 feet. This variety of experience demonstrated that successful dewatering would require the construction of a modern (for that time) pump plant of large capacity under centralized management.

Pumping and shaft sinking for a new Pump Shaft was begun in December, 1902. Apparently the plans were to reach the 1,000-foot level in less than two years; however, a four-year time period was required before the 1,000-foot level was actually reached. Interruptions to the steam power supply caused the ultimate submergence of the pumping equipment in June, 1909. Records indicate that the Pump Shaft produced 36,900 acre feet of ground water over the 8-year period, or an average of 2,830 gallons per minute, with a maximum pumpage of 5,280 gallons per minute for a 24-hour period. The pumpage resulted in a 440 drawdown

during cross cutting operations on the 1,000-foot level. Efforts to regain the 1,000-foot level led to the ultimate termination of pumping in January, 1911 and the resultant bankruptcy of the Tombstone Consolidated Mines Company.

Problems encountered during these dewatering operations were primarily related to the insufficient pumping capacity and problems associated with submergence of equipment during brief periods of power supply failure. Finally, the companies failed to take into account the vast quantity of water which would have to be pumped from storage during dewatering operations. Such dewatering operations were, of course, conducted before geohydrology theories were developed.

During 1954 and early 1955, Newmont Mining Corporation conducted an extensive dewatering operation, utilizing the West Side shaft to dewater the 600-foot level, provide water for diamond drilling, and test aquifer response. The dewatering operations were carefully monitored, utilizing the modern techniques of geohydrology. The West Side shaft produced an average of 505 gallons per minute for the first six months, and 41 gallons per minute for the remaining nine months. The water level was lowered approximately 35 feet in the West Side shaft, with a concomitant lowering of approximately 13 feet at an observation well one-third of a mile away. The main problem during this time was the clogging of pump intake screens with wood pulp and debris from the flooded workings.

The first recorded use of the ground water for municipal supply was in May, 1948, at which time Tombstone completed its 700-foot-deep Well #1 on the south side of town, to augment the municipal water supply derived from springs, located in Miller Canyon, during periods of low flow. Intermittent pumping of approximately 260 gallons per minute occurs during daylight hours on peak demand.

The various efforts at dewatering have been utilized to determine aquifer characteristics such as the coefficient of transmissibility (T) and the coefficient of storage (S). Assumptions implicit in hydrologic theory require that:

- The aquifer is homogeneous and isotropic;
- The well being tested completely penetrates the aquifer and is of infinitesimal diameter,
- The coefficient of transmissibility is constant in all places and at all times,
- The aquifer is bounded by impermeable strata both above and below,
- The coefficient of storage is constant and water is released instantaneously from storage with a decline in head,

- The flow to the well is laminar and radial or unidimensional in sectional view, and

- The aquifer is of infinite areal extent.

Geologic evidence indicates that none of these assumptions is actually valid in the Tombstone Mining District. In spite of the significant departures, the assumptions may be approximately fulfilled by taking into account the macro-scale fissure patterns and the interconnections formed by the extensive mine workings in the Tombstone Mining District. Hollyday (1963) concluded that the Tombstone aquifer complex may, indeed, be treated by hydrologic theory if observation well data is taken from tests of long duration. Hollyday utilized the existing pumping data to calculate transmissivities and storage coefficients. Table 1, adapted from Hollyday, provides information calculated on the various pumping efforts during the period from 1903 to 1955. Coefficient of transmissibility values range over a rather narrow range from 10,000 to 15,000 gallons per day per foot. The coefficient of storage ranges from a low of 0.003 to a high value of 0.2. Hollyday explained this rather wide range as a change in storage coefficient as the cone of depression spreads. In essence, the pumping efforts are significantly different depending on whether or not the interconnected workings are dewatered.

2.2.3 Ground-Water Utilization

Ground water is not generally used widely in the PBR Minerals area, as a result of the great depth to water, and the ready availability of an imported source of potable water from springs in Miller Canyon, supplied by the Town of Tombstone. Nearby ranches utilize windmills drawing from perched water masses in alluvium along various dry washes. Table 2 provides information on wells registered with the State of Arizona within at least a 3-mile radius of the proposed PBR site. These wells are located on Plate 11-1, reproduced from a recently-submitted "Application for a Ground-Water Quality Protection Permit".

PBR Minerals currently maintains 3 wells in the vicinity of their existing wash facility. One of these (well #2, D-22-20-12ccd) is pumped continuously and used for makeup water at the facility. While no completion data are available on this well, it is located in the vicinity of numerous old mine workings, and probably draws water from old mine openings. The other two PBR Minerals wells (wells #1, D-22-20-12ccd, and #3, D-22-20-11ddb) are also in the general vicinity of mine workings; however, they are not pumped except on an intermittent basis, for water-quality sampling. As will be discussed in the following section, the water quality of wells #1 and #3 indicate they are not completed in as highly mineralized a rock mass as is well #2.

Ground water from the competent rock formations is withdrawn for supplemental municipal use by means of Tombstone Well #1 (D-22-11adb). As reported by Hollyday (1963), this 700-ft deep well was completed in

May, 1948 and is pumped at a rate of 260 gpm during daylight hours during periods of peak demand. The Tombstone Well is located approximately ½ mile northwest of and downgradient from PBR Well No. 2.

5.2.4 Ground-Water Quality

Prior, published studies of the geohydrology of the Tombstone area have not addressed water quality to any significant detail. Hollyday (1963) makes no mention of water quality. Fortunately, PBR Minerals and its predecessors have collected water quality data, for selected parameters, over a long period of record. Occasionally samples have been collected and assayed for a more complete suite of parameters, by both PBR Minerals and the Arizona Department of Health Services.

Table 3 presents data on the concentration of mercury, nitrate, and total and free cyanide for the three PBR wells and Tombstone Well #1 during the period June 16, 1987 through May 5, 1988. These samples were collected by the PBR chemist or by personnel from Smith and Smith Laboratories, and analyzed by Smith and Smith Laboratories. The data are also plotted on Figure 1, with concentration shown as a function of time.

The data show that Wells #1 and 3 are generally of high quality. Well #2 is generally more mineralized, as a result of its location within the area of old mine workings. This is reflected by the relatively elevated values of mercury, with a mean concentration of 0.026 mg/l and a standard deviation of 0.006 mg/l for the period June, 1987 through April, 1988. This is 13 times the US EPA Primary Drinking Water standard of 0.002 mg/l, and doubtless reflects a long-term contamination associated with natural mineralization, perhaps exacerbated by historial use of mercury for precious-metals recovery. Mercury is not generally detected in PBR Wells #1 or #3, with only one detection value (caused by a contaminated sample container) in Well #3, and no detectable values in Well #1. The Tombstone well has only one, barely-detectable mercury value.

During prior Well #2 monitoring by the previous operator (T.E.I.), it was found that the well contained detectable free and total cyanide. There is no Federal drinking water standard for cyanide; however, Arizona uses a value of 0.20 mg/l total cyanide. It was believed that this contamination likely had resulted from prior use of cyanide for precious-metals leaching by prior tenants of the site. Elevated values of nitrate, in excess of the EPA Primary Drinking Water Standard, were also considered to be from the prior use of cyanide, as cyanide can be oxidized to form nitrate. Nitric acid had also reportedly been used by a prior tenant.

On February 23, 1987, representatives of the Arizona Department of Health Services (ADHS) collected samples of water from Well #2, and from Tombstone Well #1, and analyzed these samples for major ions, nutrients, and trace metals. The sample from Well #2 (Table 4) was found to contain 0.200 mg/l total cyanide, but no detectable free

cyanide. The "total" cyanide was probably present in the form of a stable metallic complex such as copper, iron, or nickel cyanide. Mercury was present at elevated levels of 0.0235 mg/l, which is consistent with PBR monitoring results, and nitrate was present at 27.3 mg/l, again generally consistent with the levels established by PBR monitoring. Best (July 9, 1987) indicates earlier sampling had detected up to 74.8 mg/l nitrate on May 8, 1986; thus the levels have declined somewhat.

The ADHS sample from Tombstone #1 did not detect mercury or cyanide. Nitrate was present at 10.32 mg.l, slightly in excess of the EPA Primary Drinking Water Standard.

Major-ion data from the two ADHS samples, collected February 23, 1987, were entered into a computer data base and used to generate trilinear plots (Piper diagrams) and Stiff plots (Figure 2 and 3). As shown by the diagrams, both waters are calcium bicarbonate types, with Well #2 showing somewhat greater concentrations of magnesium sulfate. This is consistent with the known mineralization in the area of the well. The reported potassium value of 410 mg/l apparently is a typographical error and should have been 4.10 mg/l. The reported value cannot be correct, and a value of 4.10 is consistent with the ion balance. Using 4.10 mg/l yields an ion balance of 1.3, whereas use of 410 mg/l yields an unacceptance ion balance of 3.98.

On May 5, 1988, samples of water were collected from PBR Wells #1 and #2 and from Tombstone Well #1 by personnel of Geochemical Engineering, Inc. and PBR Minerals, Inc. Prior to sampling, the wells were pumped to purge standing water in the well bore. Samples were collected directly from the wellhead into appropriately pre-preserved, clean sample containers and delivered to the analytical laboratories within 24 hours of sample collection.

In addition to the normal sample parameters, sample analysis was requested for all metals covered by Primary and Secondary Drinking Water Standards, and for major-ion concentrations. To provide quality control information on the existing data base from Smith and Smith labs, a blind duplicate sample was collected from PBR Well #2, intentionally misidentified as "PBR Well #6", and sent to Smith and Smith labs. An interlaboratory quality control sample was collected from Well #2 and submitted to Western Technologies, Inc. lab. For PBR Well #1 and Tombstone Well #1, interlaboratory duplicate samples were also collected for the two laboratories. Results of the May 5, 1988 sampling are provided on Table 5.

The interlaboratory and intralaboratory quality control duplicates indicate that Smith and Smith Labs (the prime lab that has been used in the development of the existing data base) are capable of producing data that agrees within the lab and between labs, and hence produce a credible data base.

The results from both labs confirm that the various wells comply with Drinking Water Standards, with the exception of mercury, nitrate and total dissolved solids in Well #2. The mercury and TDS are probably a result of natural mineralization in the rock around Well #2, while the nitrate is from both natural sources and prior waste-disposal practices in the vicinity. Well #2 generally meets the Arizona total cyanide standard of 0.20 mg/l.

Major-ion data from Western Technologies' results was used to plot trilinear and Stiff diagrams (Figures 4 and 5) for the 3 wells. As with the earlier ADHS results (Figures 2 and 3), the waters are calcium bicarbonate types, with Well #2 being a calcium (magnesium) sulfate bicarbonate type, reflecting the presence of mineralization in and adjacent to the old underground workings in the vicinity of the well. PBR Well #1 shows the least effect of mineralization; this despite the proximity of this well to a number of shafts. Tombstone Well #1 is an intermediate quality between the two PBR wells.

The data indicate that "background" values of nitrate are very close to the EPA Drinking Water Standard. Such a finding is not at all uncommon, especially in semiarid regions. Nitrate is "fixed" from atmospheric sources and flushed to the water table. Numerous investigations have documented the presence of nitrate salts and minerals in soils and rock material above the water table in arid regions. These investigations have also shown that nitrate salts can be leached by increasing infiltration of meteoric water or by elevation changes in the water table. In the case of the Tombstone Well, this may have been exacerbated by the prior disposal of sewage into old mine workings in the vicinity of the town well.

The data strongly indicated a relationship between prior use of cyanide at the site and observed elevated values of cyanide and nitrate in Well #2; however, this was not consistent with geochemical experience. While it is known that nitrate commonly is conservative (e.g., it moves at the same rate as ground water), the geochemical literature has documented that cyanide tends to form metallic complexes and not be mobile in the ground-water environment. It was thus difficult to explain how cyanide from the old processing facility could have migrated 500 feet to the water table, followed by a lateral migration of several hundred feet to report to Well #2.

This question was answered in a rather direct manner during April, 1988. During the process of removing contaminated clay from a prior liquid holding pond, an earth scraper broke through into a vertical shaft leading to abandoned mine workings connected to mine workings in the vicinity of Well #2. It became readily apparent that cyanide-bearing wastes had percolated through the clay covering the vertical shaft, moved down the shaft, and reported to Well #2. Continued pumping of this well has returned the free cyanide to generally non-detectable levels. There have been annual peaks of free cyanide, probably associated with rainfall and resultant migration of recharge down the shaft. This should not be a future factor, now that the

contaminated clay has been removed from around the shaft collar. Nitrate values remain elevated, both as a result of the natural background levels and the oxidation of cyanide complex to generate nitrate. This nitrate should slowly be reduced to background levels as the sorbed cyanide complex is oxidized and migrates to the withdrawal point formed by the continued withdrawal of water from Well No. 2. Such continued withdrawal assures that the contamination not migrate off-site. Monitoring of Well No. 1 will also serve to provide an "early warning" of such off-site migration.

3.0 CONCLUSIONS

The contamination of Well No. 2 resulted from the free movement of cyanide solutions down the mine shaft underlying the waste impoundment utilized by the previous site occupant. Removal of contaminated soil and discontinuation of impoundment of water in the pond has effectively eliminated this source of contamination.

Water-quality monitoring data indicates that water produced from Well No. 2 now meets Arizona cyanide standards. Nitrate levels remain elevated, as a result of natural nitrate backgrounds and the oxidation of cyanide complex, likely sorbed onto rocks. Continued ground-water withdrawal from Well No. 2 will assist in localizing the areal extent of contamination. Proposed additional withdrawals from a pumped monitor well approximately ½ mile south of Well No. 2 will further assist in assuring that off-site migration not occur.

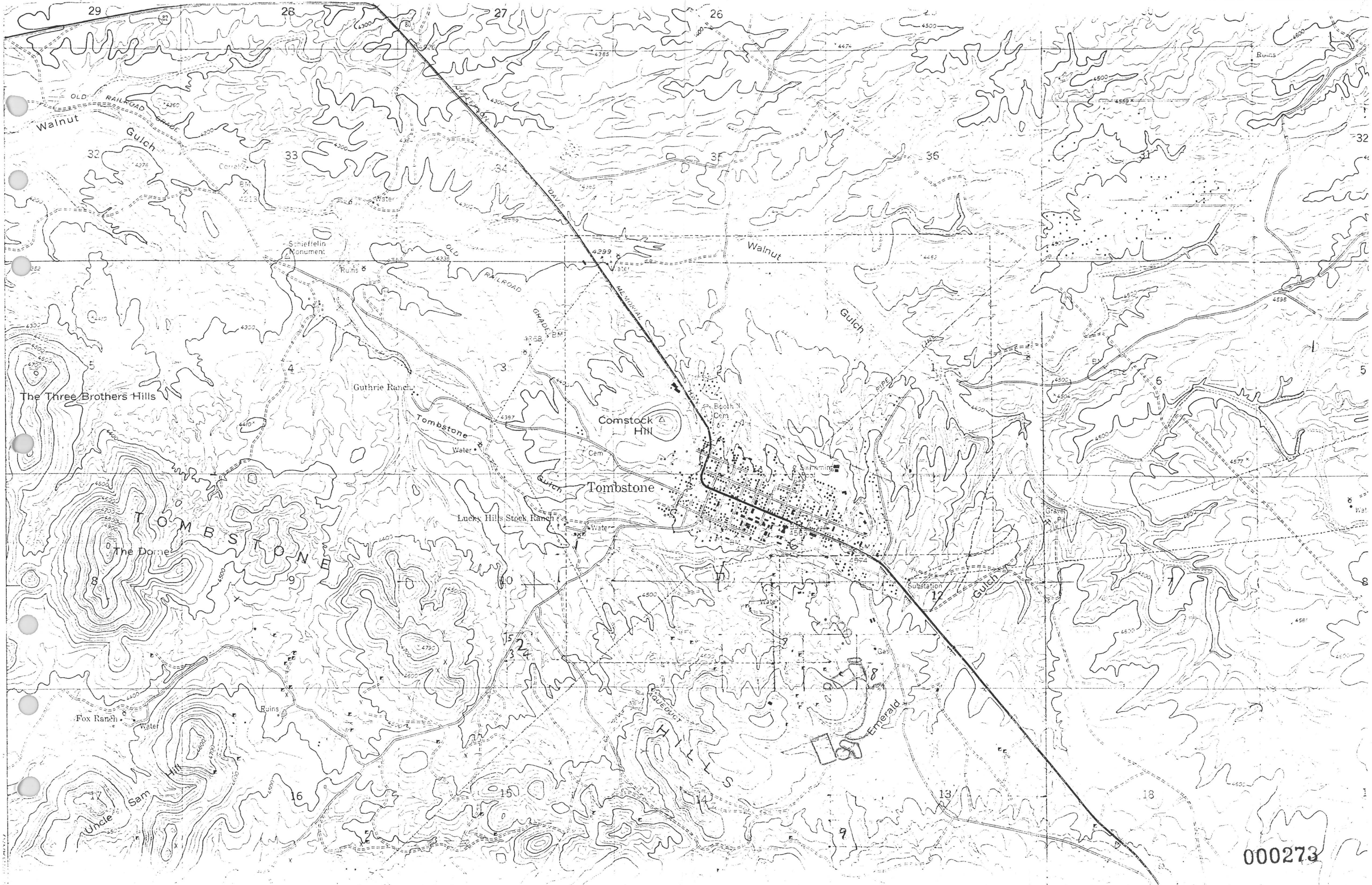
Table 1 Calculated Values of Transmissivity (T) and Storage Coefficient by Pumping Event Corrected for Schieffelin Grandodiorite Boundary (From Hollyday, 1963)

Date	Pumped Well	Observation Well	T, (gpd/ft)	S	Notes
1903-11	Pump Shaft	Emerald Shaft	12,000	0.0035	Drawdown
1903-11	Pump Shaft	Silver Thread Shaft	14,000	0.003	Drawdown
1903-11	Pump Shaft	West Side Shaft	12,000	0.003	Drawdown
1903-11	Pump Shaft	Pump Shaft	12,000	0.003	Drawdown (1)
1911-18	Pump Shaft	Pump Shaft	15,000	0.01	Recovery
1953-54	West Side Shaft	West Side Shaft	15,000	0.1 to 0.01	Drawdown (2)
1953-54	West Side Shaft	West Side Shafft	10,000	0.2	Recovery (3)

Notes: (1) Points selected for near steady-flow conditions
(2) Apparent change in S as cone expands
(3) Minor pumping during recovery period

ARIZONA DEPARTMENT OF WATER RESOURCES WELL REGISTRATION REPORT
OPERATIONS DIVISION

Plate II-1 Key	QUAD	TOWN	RNGE	SECT	QTR 1	QTR 2	QTR 3	REG NO	NAME	WELL DEPTH	DEPTH CASED	COUNTY AREA	WATER LEVEL	YIELD (GPM)	WELL DRILL DATE
1	D	19.0	22.0	33	D	A	C	55-616263	AZ STATE LAND DEPT	0140	0140	06	0070	00013	0/00/1879
2	D	19.0	22.0	33	D	A	C	55-646126	PIONEER NAT TRUSTCO	0140	0140	06	0070	00015	0/00/1879
3	D	19.0	22.0	35	C	C	C	55-616264	AZ STATE LAND DEPT	0150	0150	06	0070	00013	0/00/1952
4	D	19.0	22.0	35	C	C	C	55-646121	PIONEER NAT TRUST CO	0150	0150	06	0070	00015	0/00/1879
5	D	19.0	22.0	35	D	D	C	55-632637	US DEPT OF AGRICULT	0314	0314	06	0233	00000	12/00/1966
6	D	19.0	23.0	31	C	C		55-603454	HOLIDAY ENT INC	0505	0505	08	0394	00100	3/00/1963
7	D	19.0	23.0	31	D	D	D	55-602550	HULL	0485	0485	06	0400	00010	0/00/1963
8	D	19.0	23.0	32	A	B	B	55-519329	BALL, STEPHAN	0650	0650	08	0595	00000	10/23/1987
9	D	19.0	23.0	32	B	A	C	55-520988	TAYLOR, JOHN	0590	0590	08	0470	00000	6/02/1988
10	D	19.0	23.0	35	A	C	C	55-616269	AZ STATE LAND DEPT	0600	0300	06	0250	00002	12/31/1925
11	D	19.0	23.0	35	A	C	D	55-616270	AZ STATE LAND DEPT	0300	0250	06	0250	00002	0/00/1920
12	D	19.0	23.0	35	A	C	D	55-646073	KENDALL	0300	0250	06	0250	00000	6/00/1920
X	D	20.0	22.0	01				55-650661	HANSEN	0376		08	0315	00000	
X	D	20.0	22.0	01				55-650365	HONESMITH	0080	0025	02	0020	00000	10/00/1952
13	D	20.0	22.0	01	C	A	A	55-616499	TOMBSTONE, CITY OF	0600	0465	06	0278	00300	11/04/1967
14	D	20.0	22.0	01	D	D	C	55-616500	TOMBSTONE, CITY OF	0890	0600	16	0333	00300	0/00/1976
15	D	20.0	22.0	03	A	A	A	55-609574	BARKLEY	0232	0232	08	0000	00008	0/00/1950
16	D	20.0	22.0	04	A	A	A	55-642799	ESCAPULE	0085	0085	08	0022	00020	8/00/1967
16	D	20.0	22.0	04	A	A	A	55-642798	ESCAPULE	0040			0022	00006	0/00/1890
17	D	20.0	22.0	08	D	D	B	55-642800	ESCAPULE	0212	0080	06	0160	00000	8/03/1935
18	D	20.0	22.0	09				55-507064	SANTA FE MINING INC					00000	
19	D	20.0	22.0	10	A	D	B	55-646123	PIONEER NAT TRUST CO	0150	0150	06	0070	00015	0/00/1879
20	D	20.0	22.0	10	D	C	B	55-644489	LEE	0060	0010	06		00000	0/00/1976
20	D	20.0	22.0	10	D	C	B	55-644490	LEE	0140	0010	06	0040	00060	10/29/1976
20	D	20.0	22.0	10	D	C	B	55-644491	LEE	0040		05	0035	00000	
20	D	20.0	22.0	10	D	C	B	55-644492	LEE	0270	0010	06	0035	00005	10/29/1976
21	D	20.0	22.0	11	A	D	B	55-616498	TOMBSTONE, CITY OF	0612	0511	04	0490	00225	0/00/1941
22	D	20.0	22.0	11	D	D	B	55-086448	TOMBSTONE DEVELOPMEN	0715	0715	06	0510	00100	1/10/1981
23	D	20.0	22.0	12	C	C	A	55-516482	TOMBSTONE DEVELOPT.	0800	0800	08	0440	00170	1/17/1987
24	D	20.0	22.0	12	C	C	D	55-505610	T I E INC	0620	0580	06		00000	6/30/1983
25	D	20.0	22.0	13	C	B	C	55-622882	CRIST	1000	1000	04	0550	00035	0/00/1945
26	D	20.0	22.0	15	A			55-642575	WINTERS					00000	
27	D	20.0	22.0	15	A	C		55-650957	CAN AMERICAN MINING					00000	
27	D	20.0	22.0	15	B	D		55-650956	CAN AMERICAN MINING					00000	
27	D	20.0	22.0	15	B	D	A	55-647089	ESCAPULE			06		00000	
28	D	20.0	22.0	16	A	A	C	55-647090	ESCAPULE			06		00005	
28	D	20.0	22.0	16	A	A	C	55-645012	CHARLOU CORP	0250			0200	00000	0/00/1967
29	D	20.0	22.0	16	A	C		55-601135	TOMBSTONE SILVER	0500	0000	05	0200	00020	7/00/1968
30	D	20.0	22.0	16	B	A	C	55-645011	CHARLOU CORP	0600	0500	05	0225	00020	0/00/1974
31	D	20.0	22.0	16	D	B	B	55-086097	ESCUPULE	0310	0289	06	0194	00040	0/00/1980
32	D	20.0	22.0	16	D	D	C	55-645015	ESCAPULE	0262	0250	04	0195	00005	0/00/1963
33	D	20.0	22.0	17	A	A	A	55-647092	ESCAPULE					00000	
34	D	20.0	22.0	18	D	A	A	55-646124	PIONEER NAT TRUST CO	0150	0150	06	0070	00015	0/00/1879
35	D	20.0	22.0	18	D	A	A	55-616334	AZ STATE LAND DEPT	0150	0150	06	0070	00013	0/00/1879
36	D	20.0	22.0	20	B	C	D	55-804769	ALANCO LTD				0100	00000	0/00/1969
37	D	20.0	22.0	23	A	B		55-649056	IRVINE					00000	
38	D	20.0	22.0	23	B			55-642573	WINTERS					00000	
39	D	20.0	22.0	23	B			55-642574	WINTERS					00000	
40	D	20.0	22.0	23	B	B		55-649054	SILVER RIDGE MINING	1000	1000	04	0425	00035	0/00/1980
40	D	20.0	22.0	23	B	B		55-649055	SILVER RIDGE MINING					00000	
40	D	20.0	22.0	23	B	B	B	55-085566	SILVER RIDGE MINING	1000	1000	04	0420	00000	9/02/1980
41	D	20.0	22.0	29	A	B	D	55-616335	AZ STATE LAND DEPT	0140	0140	06	0070	00013	0/00/1879
42	D	20.0	22.0	29	A	B	D	55-646125	PIONEER NAT TRUST CO	0140	0140	06	0070	00015	0/00/1879
43	D	20.0	22.0	30	C	A	A	55-616336	AZ STATE LAND DEPT	0035	0035	06	0010	00013	0/00/1879
43	D	20.0	22.0	30	C	A	A	55-646122	PIONEER NAT TRUST CO	0035	0035	06	0010	00015	0/00/1879
44	D	20.0	23.0	08	B	A	A	55-619135	COWON	0427	0436	06	0362	00015	5/30/1934
45	D	20.0	23.0	29	D	C	C	55-511150	WHITE	0350	0350	08	0175	00015	11/01/1985


Tombstone
Comstock Hill
Walnut Gulch
Gulch
OLD RAILROAD GRADE
DAVIS MEMORIAL HWY
JEFFERSON
Schieffelin Monument
Ruins
Guthrie Ranch
Tombstone Gulch
Water
Cem
Boothill Cem
Swimming Pool
Lucky Hills Stock Ranch
Substation
Gravel Pit
Emerald
AQUEDUCT
TOMBSTONE HILLS
The Three Brothers Hills
The Dome
Fox Ranch
Uncle Sam Hill
PIPE LINE

000273

Table 3 PBR MINERALS TOMBSTONE, ARIZONA

WATER QUALITY DATA
Smith & Smith Lab

		Well #1				Well # 2				Well #3				Tombstone #1			
				Cyanide				Cyanide				Cyanide				Cyanide	
Day of Sample	Date Sampled	Mercury mg/l	Nitrate mg/l	Total mg/l	Free mg/l	Mercury mg/l	Nitrate mg/l	Total mg/l	Free mg/l	Mercury mg/l	Nitrate mg/l	Total mg/l	Free mg/l	Mercury mg/l	Nitrate mg/l	Total mg/l	Free mg/l
1	6/16/87	0.001	2.6	<.01	<.01	0.026	8.9	0.05	<.01					0.0011	5.8	<.01	<.01
38	7/24/87	<0.001	1.5	<.01	<.01	0.026	7.0	0.13	0.02					<.001	8.6	<.01	<.01
51	8/6/87	<0.001	2.0	<.01	<.01	0.024	6.7	0.13	0.03	<0.001	2.5	<0.01	<0.01	<.001	7.5	<.01	<.01
64	8/19/87					0.024	10.9	0.07	NS								
85	9/9/87	<0.001	2.3	<.01	<.01	0.026	9.0	0.08	0.01	<0.001	6.2	<0.01	<0.01	<.001	6.0	<.01	<.01
100	9/24/87					0.0264	12.4	0.13	<0.01								
113	10/7/87	<0.001	3.0	<.01	<.01	0.020	22.3	0.12	0.01					<.001	2.5	<.01	<.01
119	10/13/87									<0.001	8.7	<0.01	<0.01				
127	10/21/87					0.0235	22.3	0.08	0.01								
141	11/4/87	<0.001	2.6	<.01	<.01	0.028	24.9	0.13	0.02	<0.001	10.1	<0.01	<0.01	<.001	9.4	<.01	<.01
155	11/18/87					0.0297	16.3	0.09	0.02								
170	12/3/87	<0.001	3.3	<.01	<.01	0.026	28.8	0.04	0.01	0.0166*	17.4*	0.02*	<0.01	<.001	8.6	<.01	<.01
180	12/21/87					0.034	24.2	0.13	0.01								
204	1/6/88	<0.001	4.0	<.01	<.01	0.0386	23.5	0.14	<.01					<.001	9.1	<.01	<.01
216	1/18/88					0.029	22.6	0.09	0.01	<0.001	10.2	<0.01	<0.01				
232	2/3/88	<0.001	2.2	<.01	<.01	0.020	23.4	0.14	0.01					<.001	8.6	<.01	<.01
247	2/18/88					0.020	31.5	0.12	<.01								
261	3/3/88	<0.001	3.9	<.01	<.01	0.020	18.5	0.11	<.01					<.001	7.1	<.01	<.01
289	3/31/88					0.024	23.4	0.20	0.03								
295	4/6/88	<0.001	2.8	<.01	<.01	0.027	23.0	0.18	0.02					<.001	8.2	<.01	<.01
309	4/20/88					0.030	22.9	0.08	<.01								
323	5/4/88					0.034	17.8	0.18	0.02					<0.001	8.1	<0.01	<0.01
324	5/5/88	<0.001	2.4	<.01	<.01	0.025	-	0.15	0.01					<0.001		<0.01	<0.01
						0.028**		0.16**	0.01**								
338	5/18/88					0.034	21.2	0.12	<0.01								
	Mean:		2.717			0.027	19.159	0.117	0.015		9.18				7.46		
	Std. Dev.:		0.741			0.005	7.101	0.041	0.008		4.96				1.93		

* Contaminated Sample Container, data invalid ** Duplicate Sample

000274

Table 4

Results of Chemical Analysis

(in mg/l unless noted)

Arizona Department of Health Services

February 23, 1987 Sampling

PBR Minerals, Tombstone, Arizona

Parameter	Tombstone Well #1	PBR Minerals
Major Ions & General		
pH (units)	7.4	7.0
Conductivity (u mhos)	611	733
Calcium	72.7	91.7
Magnesium	20.3	26.9
Sodium	32.6	24.7
Potassium	3.67	410 (?)
Carbonate	<2	<2
Biocarbonate	235	183
Sulfate	50.4	81.4
Chloride	36.6	50.1
TDS	410	481
Alkalinity, Total	193	150
Alkalinity, Phenophthalien	<2	<2
Fluoride	2.08	2.17
Nitrate and Nitrite	10.35	27.3
TKN	<0.05	0.96
Metals and Trace Elements		
Arsenic	<0.020	<0.020
Barium	<0.10	<0.10
Beryllium	<0.0005	<0.0005
Boron	0.10	<0.10
Cadmium	<0.0010	0.0012
Chromium	<0.01	<0.01
Copper	<0.01	<0.01
Iron	<0.01	0.13
Lead	<0.02	<0.02
Manganese	<0.05	0.05
Mercury	<0.0005	0.0235
Selenium	<0.005	0.0052
Silver	<0.005	<0.005
Zinc	<0.05	0.255
Cyanide		
Total	<0.016	0.200
Free	<0.016	<0.016

Table 5
Interlaboratory Comparison
May 5, 1988 Sampling of PBR Minerals Wells
Tombstone, Arizona
(Western Technologies, Inc. and Smith & Smith)

Well Identity	Well #1		Well #2			Town of Tombstone Well #1		
Laboratory:	W.T.	Smith	W.T.	Smith	Smith Dup	W.T.	Smith	Drink Wtr Standards
Time Sampled:	- 09:25 -		- 09:09 -			- 10:00 -		
Laboratory Results (mg/l unless noted)								
Arsenic, Total	<0.02		<0.02	<0.01	<0.01	<0.02	<0.01	0.05
Barium, Total	<0.1		<0.1	<0.5	<0.5	<0.1	<0.5	1.0
Cadmium, Total	<0.005		<0.005	<0.01	<0.01	<0.005	<0.01	0.01
Calcium, Total	54		130	141.1	146.4	72	92.3	-
Chromium, Total	<0.02		<0.02	<0.05	<0.05	<0.02	<0.05	0.05
Copper, Total	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	1.0(2)
Iron, Total	<0.01		<0.01	<0.1	<0.1	<0.01	<0.1	0.3(2)
Lead, Total	<0.02		<0.02	<0.05	<0.05	<0.02	<0.5	0.05
Magnesium, Total	15.0		36.0	25.0	26.3	20.0	16.2	-
Manganese, Total	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	0.05(2)
Mercury	<0.001		0.027	0.029	0.028	<0.001	<0.001	0.002
Potassium, Total	4		6	8.1	8.2	5	3.9	-
Selenium, Total	<0.01		<0.01	-	-	<0.01	-	0.01
Silver, Total	<0.02		<0.02	<0.025	<0.025	<0.02	<0.025	0.05
Sodium, Total	17		2.6	32.0	32.0	29	39.0	-
Zinc, Total	<0.05		0.08	0.04	0.05	<0.05	0.02	5.0(2)
Alkalinity,Ttl.	163		157	-	-	180	-	-
Bicarbonate	199		192	-	-	220	-	-
Carbonate	<2		<2	-	-	<2	-	-
Chloride	12		44	107	108	33	98	250.0(2)
Cyanide, Total	<0.01	<0.01	0.18	0.15	0.16	<0.01	<0.01	-
Cyanide, Free	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	-
Fluoride	2.0		1.2	-	-	1.7	-	1.4-2.4(2)
Nitrate Nitrogen	1.9	2.4	23	-	-	8.2	-	10
Sulfate	26		160	173	174	47	39	250.0(2)
Total Dissolved Solids	282		666	-	-	414	-	500.0(2)

(1) Standard is Temperature Dependent
(2) Secondary Standard Only

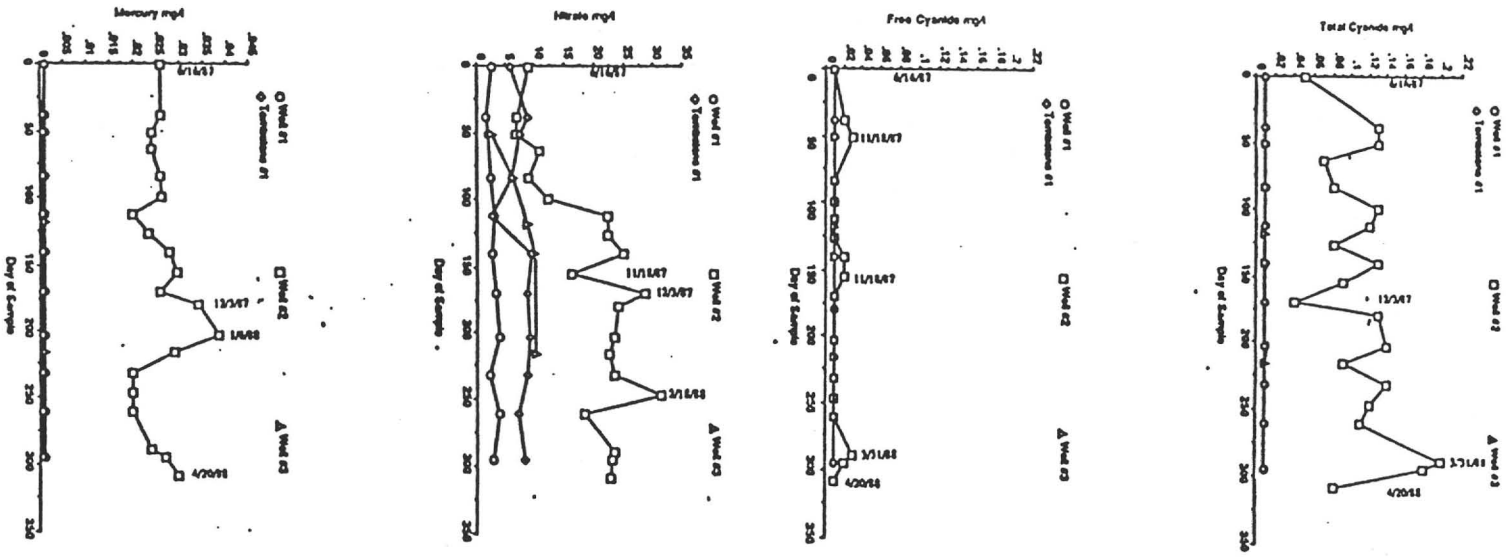


Fig. 1 Water-Quality Variation with Time,
PBR Minerals, Inc. Monitoring Data

000277

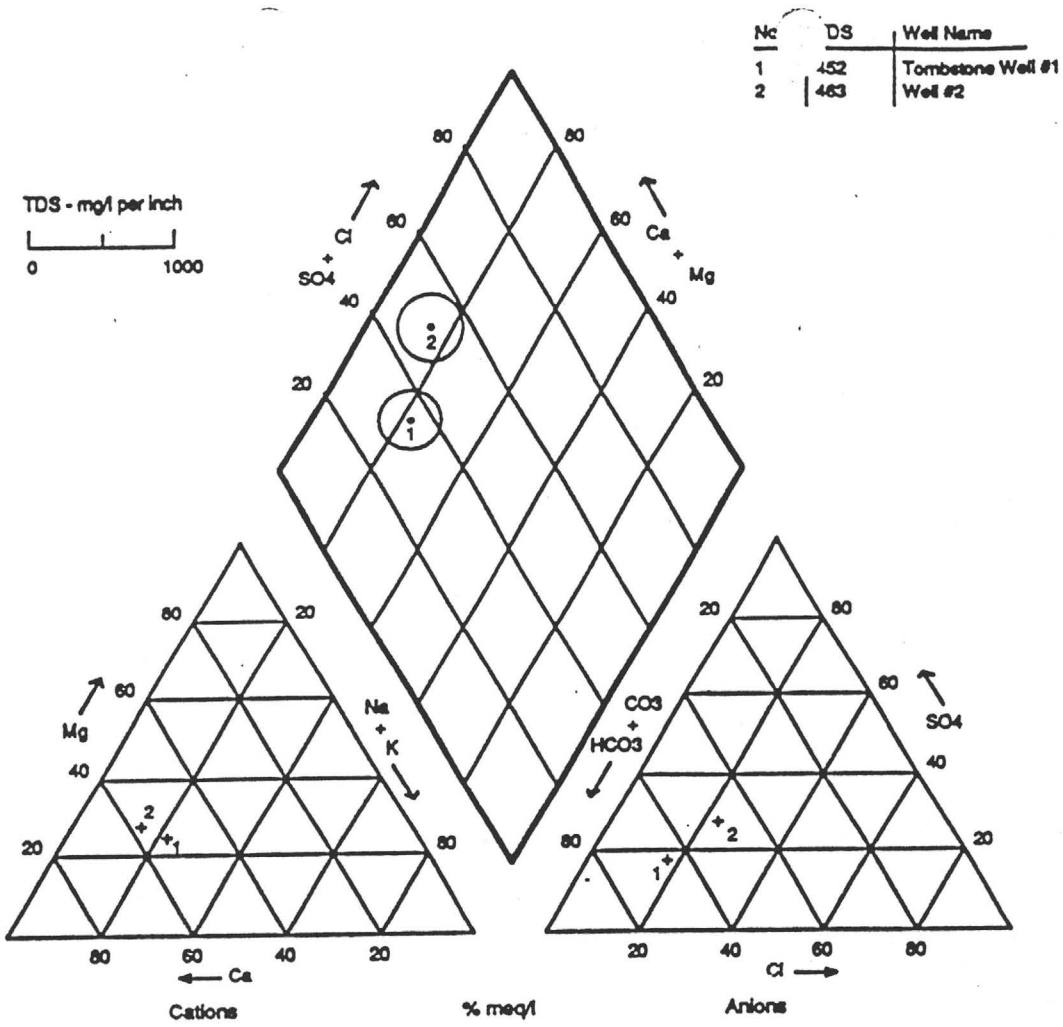


Fig. 2
ADHS DATA

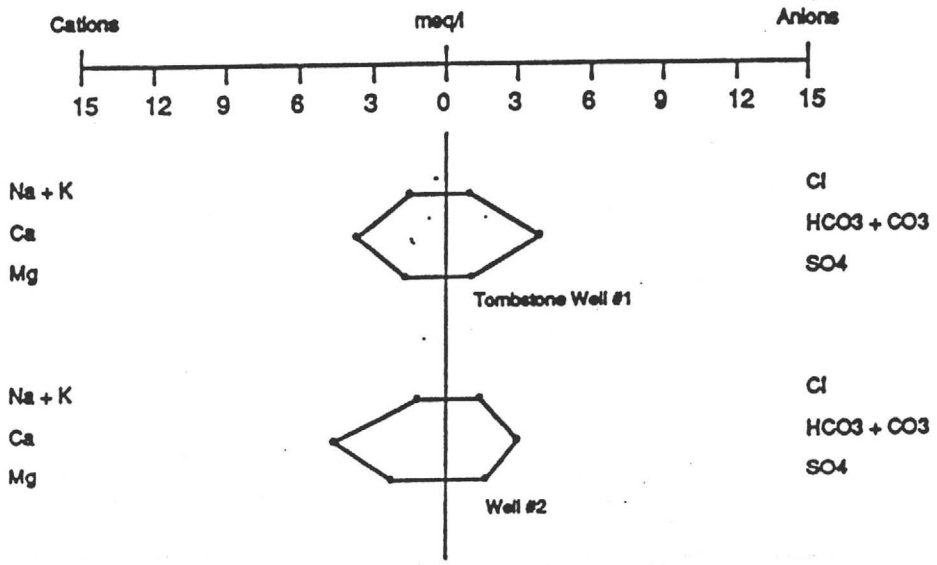


Fig. 3
PBR Minerals - Major Ions

PBR Minerals Tombstone, Arizona

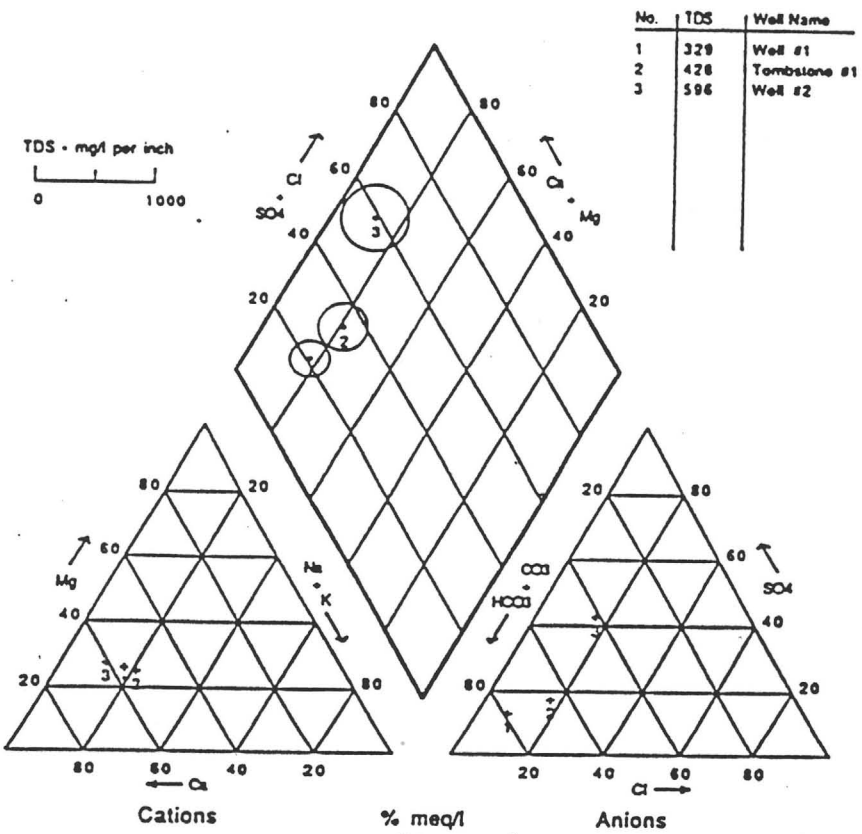


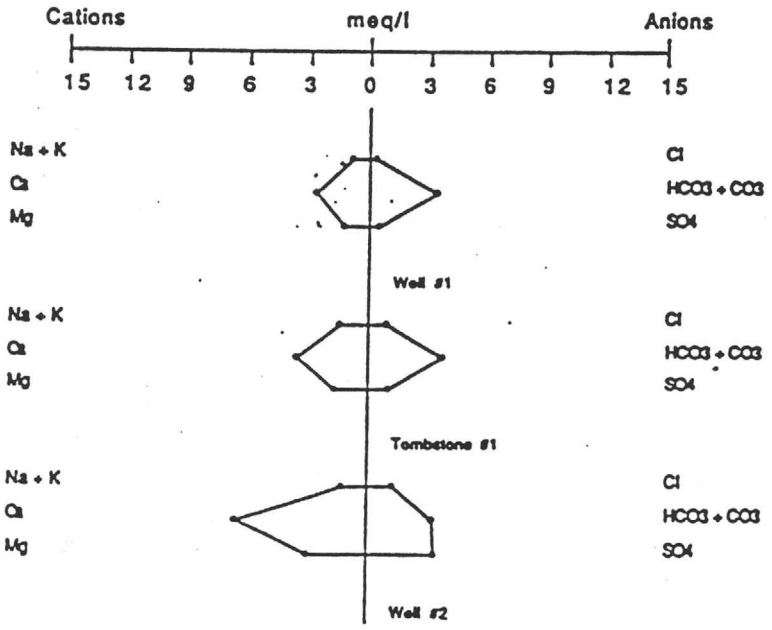
Fig. 4

May 5, 1988

Western Technologies Data

Fig. 5

PBR Minerals Tombstone, Arizona



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MISSING - ~~August~~ August & September
THROUGH - DECEMBER
1989

WELL MONITORING DATA.

see memo of Aug 16, 1989 Following

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

H-4515.051

DATE: October 2, 1989

TO: Dave Woodruff, Manager
Water Pollution Compliance Unit

THRU: Debra Daniel, Manger DMD
State Programs Hydrology Unit

FROM: James DuBois, Hydrologist JD
State Programs Hydrology Unit

RE: PBR Minerals Groundwater Quality Protection Permit

In response to your request of July 28, 1989 I visited the facility on July 31, 1989. I sampled two of the four monitor wells, all three of Tombstone's water supply wells, and the surface water supply to Tombstone's drinking water reservoir. Full analytical results have not yet been received from the lab. However, I do have the following information to report:

Sample	Sample #	Hg(mg/l)	NO_3(as N in mg/l)	Total CN(mg/l)
Monitor Well#1	16837	0.0072	2.02	0.049
Monitor Well#2	16838	0.0183	23.4	0.115
	16839	0.0184	22.8	0.124
Municipal Well#1	16840	<0.0005	9.13	0.052
	16841	<0.0005	8.85	0.052
Municipal Well#2	16843	<0.0005	2.84	0.023*
Municipal Well#3	16844	<0.0005	3.34	0.027*
City Reservoir	16845	<0.0005	<0.10	<0.020

* These values below quantified detection limit of 0.045 mg/l.

This data indicates that Tombstone's water supply is within drinking water MCL's for mercury and nitrate and that cyanide concentrations are well below the State HBGL of 0.220 mg/l.

I will be able to make some more extensive interpretations once the full set of data has been reported. I also reviewed the permit conditions and have identified in the attached list those which may represent compliance problems.

Please call me if you have any questions about this facility.

JD:dl

cc: Andy Rendes

RECEIVED
OCT 4 1989
ADEQ – OWQ
COMPLIANCE SECTION

Comments on Permit Conditions Compliance
GQP Permit No. G-0020-02

Date Visited: July 31, 1989

Personnel: James DuBois/A. Rendes of ADEQ
Gary Lindroos of PBR Minerals, Inc.

Part II.A.1.e. We did not inspect the spent ore disposal area and its liner. I recommend that copies of the records for construction testing of liner compaction be obtained for verification.

Part II.A.1.f. The stormwater pond had water in it during our site visit. The pregnant and barren solution ponds were drained, but the two other ponds at the site had water in them.

Part II.B.1.a. I did not observe any staff gauges or other markings for measuring solution levels in the ponds. I suggest that we request the records and water balance calculations to determine whether this monitoring is meeting permit objectives. Also, Gary Lindroos mentioned that they discovered rips in the liner of the pregnant pond when they drained it recently. Water balance data might indicate the magnitude of the leaks.

Part II.B.1.a. The leak collection sampling points are not capped. There was fluid in the sump of the northern most pond which I believe was used as the barren solution pond. However, the facility has no adequate method of sampling the leak collection sumps. I recommend that they install tubing and a pump to obtain a good sample and to drain the sumps periodically.

Part II.B.1.c. During our visit, spent ore was being removed from the pads and trucked away for disposal. The permit requires submission of written records of spent ore sampling to D.E.Q. Have we received this data?

Part II.B.1.d. This section of the permit in conjunction with Part II.E.1. requires three rounds of ambient sampling of monitor well #4 prior to facility operation. My records indicate that the well was first sampled on May 31, 1989, long after the facility began leaching. I don't see how we can get meaningful ambient data here. Also, monitor well #4 is not equipped for regular sampling. We were not able to obtain a sample because there was no power supply to the well.

Part II.B.1.e. This section specifies constituents for monitoring. The recent monitoring data does not include analyses for sodium, sulfate, and zinc. Also, data regarding time, name of technician, volume of water extracted, temperature of groundwater, and Ec, are not reported. Sampling of monitor well #4 on May 31 and June 7 indicate exceedance of the specified permit AL's for cyanide, arsenic, and lead. Also, on June 7, the MGL for nitrate was exceeded. Were the Contingency Requirements of Part II.C.1. fulfilled?

Part II.E. On our visit, we intended to sample monitor well #3 and found that the well had been replaced with another well at the same site. Gary Lindroos denied us sampling access to the new well, claiming that Santa Fe Minerals owned it. If PBR does not have sampling access to this replacement well, then they should drill their own replacement well to meet the permit conditions for continued sampling at this site.

Part II.E.2. Pump testing of TEI Well #2 was conducted on August 16-21, with data submitted to the Department on August 21st. This test may meet the requirement as stated in the permit, but the permittee did not measure groundwater levels in TEI Well #1 during the test. Also, historical pumping records for TEI Well #2 were not submitted.

Part II.E.3.c. No water quality data for TEI Well #3 has been submitted.

Part II.E.3.d. Proposed locations of two additional monitoring wells were submitted on August 21, 1989.

Part II.E.4. Additional monitor wells have not been constructed.

1990
LAB ANALYSIS DATA

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

2998-2
SPECIMEN NO.

01-17-90
DATE REC'D AT LAB

Name & Address — LAB ID NO. 00060

AMERICAN ANALYTICAL LABORATORIES
3441 E. MILBER ST.
TUCSON, AZ 85714

RECEIVED
FEB 5 1990
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location WELL #1

Facility Name & Mailing Address

PBR MINERALS, INC.
P.O. BOX 370
OLD BISBEE HIGHWAY
TOMBSTONE, AZ 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other Well #1
Sample Date 01-17-90 Sample Time 09:00
Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019

Collected By: G. LINDROOS

ADHS Use Only

SC.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	<0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	1.5 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	CYANIDE (Free)	,	<0.007 ,
Silver +	P01077,	. ,	CYANIDE (Total)	,	<0.007 ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

13 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
15 North Central
Phoenix, Arizona 85004

Comments: _____

Analysis Date 1/30/90
Analyst [signature]

000287

Groundwater Quality Protection Permit
Self-Monitoring Report Form
.ona Department of Health Services

2998-3
SPECIMEN NO.

01-17-90
DATE REC'D AT LAB

Name & Address
MEI CAN ANALYTICAL LABORATORIES
441 E. MILBER ST.
UCSON, AZ 85714

LAB ID NO. 00060

RECEIVED
FEB 5 1990
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location WELL #2

Facility Name & Mailing Address
PBR MINERALS, INC.
P.O. BOX 370
OLD BISBEE HIGHWAY
TOMBSTONE, AZ 85638

SAMPLE COLLECTION INFORMATION
☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other WELL #2
Sample Date 01-17-90 Sample Time 09:45
Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019

Collected By: G. LINDROOS

HS Use Only

C.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
rsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
arium +	P01007,	. ,	Lindane[a]	P39782,	. ,
admium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
hromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
ead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
ercury +	P71900,	0.0016 ,	2,4,5-TP Silvex[a]	P39045,	. ,
itrate(N)	P00620,	23.4 ,	TTHM[a]	P82080,	. ,
elenium +	P01147,	. ,	CYANIDE (FREE)	,	<0.007 ,
ilver +	P01077,	. ,	CYANIDE (TOTAL)	,	0.02 ,
luoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
lkalinity	P00410,	. ,		,	. ,
alcium	P00916,	. ,		,	. ,
hloride	P00940,	. ,		,	. ,
opper +	P01042,	. ,		,	. ,
ardne	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
on +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
agnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
anganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
H	P00403,	. ,	Cesium-134[b]	P28414,	. ,
odium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
ulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
DS	P00500,	. ,	Tritium[b]	P82126,	. ,
inc +	P01092,	. ,	Uranium[b]	P22706,	. ,

Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

13 co of completed form to:
ona Department of Health Services
ce of Waste and Water Quality Mgmt.
pliance Section
m 304
North Central
enix, Arizona 85004

Comments: _____

Analysis Date 1/30/90
Analyst [signature]

000288

Groundwater Quality Protection Permit

Self-Monitoring Report Form
Arizona Department of Health Services

2998-1
SPECIMEN NO.

01-17-90
DATE REC'D AT LAB

Name & Address — LAB ID NO. 00060

AMERICAN ANALYTICAL LABORATORIES
3441 E. MILBER ST.
TUCSON, AZ 85714

RECEIVED
FEB 5 1990
ADEQ - OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location WELL #4

Facility Name & Mailing Address
PBR MINERALS, INC.
P.O. BOX 370
OLD BISBEE HIGHWAY
TOMBSTONE, AZ 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other WELL #4
Sample Date 01-17-90 Sample Time 10:45
Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019
Collected By: G. LINDROOS

ADHS Use Only

SC.

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	<0.005	Endrin[a]	P39390,	
Barium +	P01007,		Lindane[a]	P39782,	
Cadmium +	P01027,		MethoxyChlor[a]	P39480,	
Chromium +	P01034,		Toxaphene[a]	P39400,	
Lead +	P01051,	<0.02	2,4-D[a]	P39730,	
Mercury +	P71900,	<0.001	2,4,5-TP Silvex[a]	P39045,	
Nitrate(N)	P00620,	<0.2	TTHM[a]	P82080,	
Selenium +	P01147,		Potassium		4.57
Silver +	P01077,	<0.001			
Fluoride	P00951,				
CYANIDES (Total)		0.01			
Alkalinity	P00410,				
Calcium	P00916,	19.			
Chloride	P00940,	68.			
Copper +	P01042,				
Hardness	P00900,		Radium-226/228[b]	P11503,	
Iron +	P01045,		Gross Alpha, Tot[b]	P01501,	
Magnesium	P00927,	19.7	— Count Error[b]	P01502,	
Manganese +	P01055,		Beta Activity[b]	P03501,	
pH	P00403,	8.64	Cesium-134[b]	P28414,	
Sodium	P00929,	26.6	Iodine-131[b]	P28301,	
Sulfate	P00945,	42.	Strontium-90/89[b]	P01082,	
TDS	P00500,	310.	Tritium[b]	P82126,	
Zinc +	P01092,	1.1	Uranium[b]	P22706,	

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

13 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
1645 North Central
Phoenix, Arizona 85004

Comments:

Analysis Date 1/30/90
Analyst [signature]

000289

PBR MINERALS, INC.
P.O. BOX 370
TOMBSTONE, ARIZONA 85638
(602) 457-2282

ADEQ Received
01/30/90
- BKV -

January 23, 1990

Arizona Department of Environmental Quality
Office of Waste and Water Quality Management
Compliance Section
2005 North Central Avenue
Phoenix, Arizona 85004

Re: Permit No. G-0020-02

Dear Sirs:

The following is the field summary reports for the months of October, November, and December, 1989.

LOCATION	FREE CYANIDE	LAB ANALYSIS
TEI Well No. 1	Mg/L	<0.01
TEI Well No. 2	Mg/L	<0.01
TEI Well No. 4	Mg/L	<0.01
Tombstone City Well No. 1	Mg/L	<0.01
Leak Detection System	-- NO MOISTURE DETECTED --	

The method of analysis for all samples was Hach DR 1/A Colorimeter.

Should you have any questions concerning this report, please feel free to contact me at the number listed above.

Sincerely,

PBR MINERALS, INC.

Gary A. Lindroos
Technical Superintendent

GAL:cr

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____ DATE REC'D AT LAB _____

RECEIVED
JAN 30 1990
ADEQ — OWQ
COMPLIANCE SECTION

Lab Name & Address — LAB ID NO.

ADHS Permit No. G-0020-02

Sample Location TEI Well No. 1

Facility Name & Mailing Address
PBR Minerals, Inc./
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0.01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
1005 North Central
Phoenix, Arizona 85004

Comments: Field Summary: October, November, December, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date _____

Analyst _____

000291

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO.

DATE REC'D AT LAB

Lab[illegible]e & Address

LAB ID NO.

RECEIVED

JAN 3[illegible] 1990

ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location TEI Well No. 2

Facility Name & Mailing Address

PBR Minerals, Inc./
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other

Sample Date Sample Time

Depth to Water Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C ,

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chr[illegible]mium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lea[illegible] +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0.01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Har[illegible]ss	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sod[illegible]	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

[illegible]end 3 [illegible]ies of completed form to:

[illegible]ffice of Waste and Water Quality Mgmt.
[illegible]ompliance Section
[illegible]oom 304
[illegible]05 North Central
[illegible]hoenix, Arizona 85004

Comments: Field Summary: October, November, December, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date

Analyst

000292

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____ DATE REC'D AT LAB _____

Lab Name & Address LAB ID NO.

RECEIVED
JAN 30 1990
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location TEI Well No. 4

Facility Name & Mailing Address
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0 . 01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
1005 North Central
Phoenix, Arizona 85004

Comments: Field Summary: October, November, December, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date _____

Analyst _____

000293

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____

DATE REC'D AT LAB _____

Lab[illegible]ne & Address

LAB ID NO.

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well No. 1

RECEIVED

JAN 30 1990

ADEQ — OWQ
COMPLIANCE SECTION

Facility Name & Mailing Address

PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

XX Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chr[illegible]mium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lea[illegible] +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,	Free Cyanide	Mg/L ,	< 0.01 ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Har[illegible]s	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sod[illegible]	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

[illegible]nd 3 c[illegible]es of completed form to:

[illegible]fice of Waste and Water Quality Mgmt.
[illegible]mpliance Section
[illegible]om 304
[illegible]05 North Central
[illegible]oenix, Arizona 85004

Comments: Field Summary: October, November, December, 1989. Method of Analysis: Hach DR 1/A Colorimeter.

Analysis Date _____

Analyst _____

000294

Groundwater Quality Protection Permit

Self-Monitoring Report Form

SPECIMEN NO. _____

DATE REC'D AT LAB _____

Lab[illegible]e & Address

LAB ID NO.

RECEIVED
JAN 30 1990
ADEQ - OWQ
COMPLIANCE SECTION

ADHS Permit No. G-0020-02

Sample Location Leak Detection Systems

Facility Name & Mailing Address
PBR MInerals, Inc.
P.O. Box 370
Tomnbstone, AZ 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond

☐ Other _____

Sample Date _____ Sample Time _____

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	. ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lea[illegible] +	P01051,	. ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	. ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	. ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	. ,		,	. ,
Fluoride	P00951,	. ,		,	. ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	. ,		,	. ,
Chloride	P00940,	. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hard[illegible]s	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	. ,	Cesium-134[b]	P28414,	. ,
Sodi[illegible]	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are μg/l
[b]Units are pCi/l

nd 3 c[illegible]s of completed form to:

ice of Waste and Water Quality Mgmt.
mpliance Section
om 304
05 North Central
oenix, Arizona 85004

Comments: Field Summary: October, November, December, 1989.

NO MOISTURE DETECTED

Analysis Date _____

Analyst _____

000295

REPORTING PART #4
CORRECTIVE ACTIONS

P.B.R. MINERALS, INC.
P.O. BOX 370
TOMBSTONE, ARIZONA 85638

April 7, 1989 CERTIFIED MAIL

Arizona Department of Environmental Quality
Water Pollution Control Compliance Section
Central Palm Plaza Building
2005 North Central Avenue
Phoenix, AZ 85004

RE: Groundwater Quality Protection Permit No. G-0020-02

Dear Sirs:

On Wednesday, April 5, 1989, at approximately 3:00 p.m. during a routine inspection, we detected fluid above the permit limits in the leak detection monitoring line of the pregnant solution pond.

We immediately diverted the fluid discharging into the pond to the neutralization pond. We then proceeded to pump the remaining solution through the process plant and into the barren solution pond. Upon inspection of the empty pond, we discovered three puncture holes in the upper membrane (30 mil HDPE) lining above the Geotextile and 30 mil PVC liner.

It is our conclusion that the punctures were caused by a wire fastener on the pond float which had lost its protective covering. After a complete inspection of the entire pond area to insure that this was the source of the leak, we tested the pond by running fresh water into it and monitoring the leak detection monitoring line for any signs of solution to be above the permit limit levels and found all of the samples to be below the limits set forth in the Groundwater Quality Protection Permit.

It is our intention to monitor this pond on a daily basis for a period of fourteen days to insure that the integrity of the liner is as competent as it was when installed by Environmental Liners. At that time, we will resume monitoring it on a weekly basis as set forth in the reporting requirements of the Groundwater Quality Protection Permit.

Sincerely,

J. Michael Ashworth

J. Michael Ashworth
President
P.B.R. MINERALS, INC.

JMA/ett

RECEIVED
APR 10 1989
ADEQ — OWQ
COMPLIANCE SECTION

POST CLOSURE PLAN

See

Volume 8, Book 18

MISC. INFO
CYANIDE & NO3's

nisi
(1944)

Cyanides - Health Hazard Considerations

The toxic form of cyanides is the hydrocyanic acid - HCN. It has a characteristic - bitter almond odor and it is volatile with a boiling point as low as 26.5°C. It is present (up to 4%) in bitter almond oil. HCN is otherwise formed by the action of an acid on cyanide salts. By this mechanism the high concentration of hydrochloric acid in the stomach leads to fast conversion of e.g. Na CN or K CN or any other form to HCN which readily gets into blood. It inhibits cytochrome oxidase, and oxygen from oxyhemoglobin cannot be utilized, persisting in venous blood. This results in bright red coloration of the skin. Cyanide is classified as a respiratory poison.

Significant hydrocyanide concentrations are present in illuminating gasses, distillates from coal tar and in the fumes of burning plastic upholstery materials. Fruit kernels of peaches, apricots, cherries, plums and pears contain high levels of hydrocyanide.

Inorganic salts of cyanide are used in various industries and may be found in their effluent water wastes: photography, electroplating, laboratory reagents, leaching of metals from ores, etc.

Absorption of cyanide occurs through the skin, the digestive and the respiratory tract and its passages.

Suicidal, homicidal and accidental deaths have been reported in the past. The average immediately fatal dose is between 200-300 mg of HCN per liter of respired air. Similarly 200-250 mg of sodium or potassium cyanide taken by mouth is fatal to adults. However, cases of death have been reported after ingestion of as little as 50 mg of the salt. Also, for children a fatal dose is very low. Ingestion of 25 bitter almonds by an adult and only 5 bitter almonds by a child have been reported fatal in the past.

Chronic poisoning is rare, it leads to pronounced pallor, headache, dizziness, loss of sense of equilibrium, nausea, vomiting, dyspnea, chest oppression, and in skin exposure cases, eczema and ulceration may appear.

Such cases show pulmonary and encephalitic edema and both liver and kidney damage.

Acute poisoning has a very short course; it leads to weakness, confusion, nausea, vomiting. Ingestion of cyanide salts leads to corrosion of the gastric mucosa and its discoloration to diffuse crimson red to rusty color. The body shows bright red discoloration from oxyhemaglobin.

The following limits have been recommended:

AIR: Federal: 5 mg/m^3

NIOSH: 5 mg/m^3 as 10 minutes ceiling value

IDLH: 50 mg/m^3

WATER: - To protect aquatic life:

a) freshwater 3.5 ug/l

not to exceed 52.0 ug/l

b) saltwater 2.0 ug/l chronic toxicity

30.0 ug/l acute toxicity

- To protect human health

200 ug/l

Maximum allowable daily intake for man

8.4 mg/day

Remedial steps:

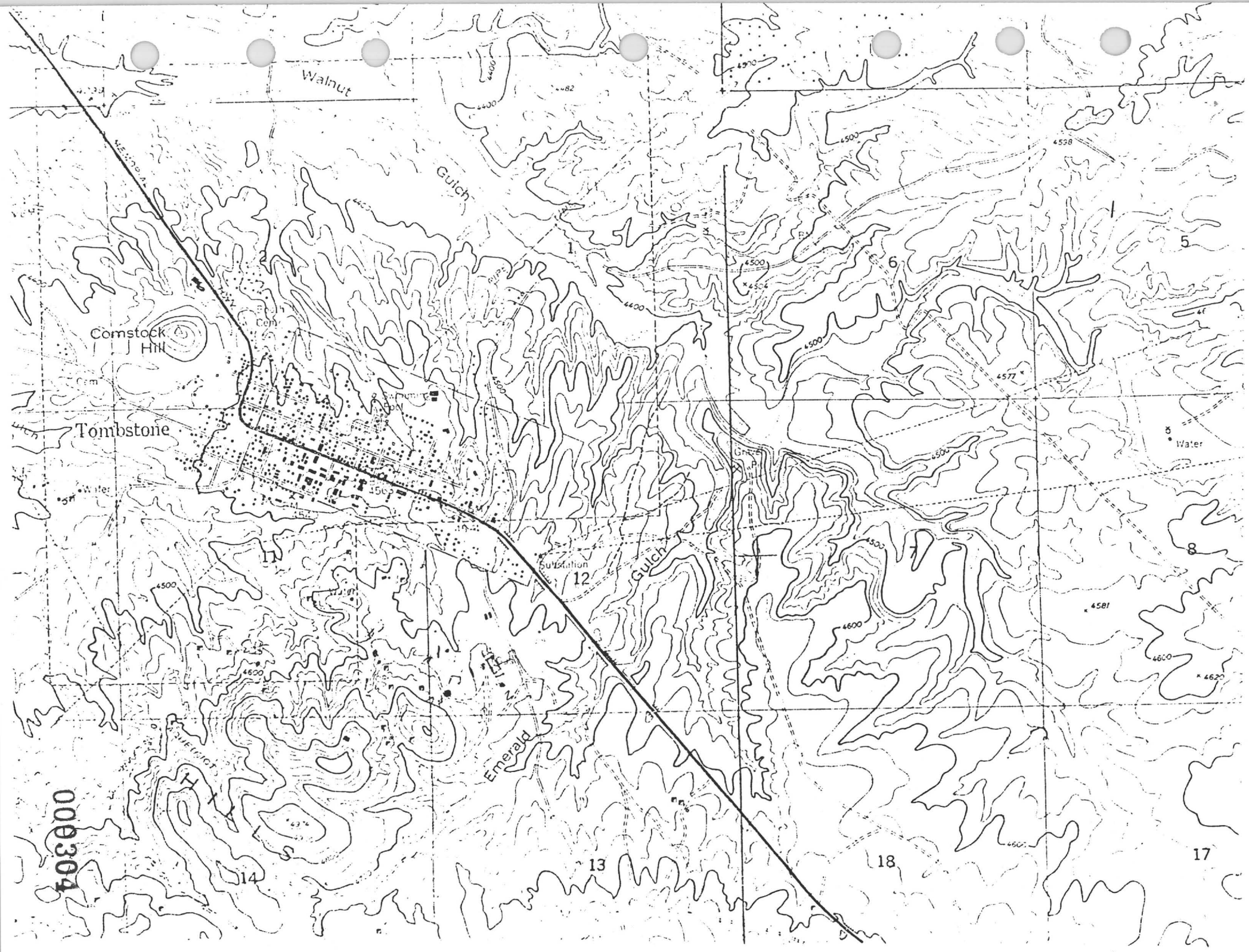
1. Identify the source and its extent.
2. Remove as much of the source as possible.
3. Decompose the residual quantities by strong alkaline hypochlorite. After 24 hours dilute with excessive water and distribute over large area.

4. Keep testing the contaminated environment.

5. Prevent human and animal exposure (external and internal).

Before 1987

According to the 1962 standards the following substances should


Walnut
Gulch
Comstock Hill
Tombstone
Water
Substation
Gulch
Emerald
1
2
5
6
8
11
12
13
14
17
18
4500
4600
4577
4581
4620

000304

TOMBSTONE CITY
WELL TESTS & MISC

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

PBR/cl

RECEIVED

JUL 14 1989

ADEQ — OWQ
COMPLIANCE SECTION

DATE: July 7, 1989

TO: Dave Woodruff, Manager
Wastewater Compliance Unit

FROM: Chiou-Lian Chen
Water Permits Unit

RE: Complaints For PBR Mineral Mine
Temporary Groundwater Protection Permit G-0019-02T
G-0020-02

This memo is to inform you that a possible contamination may have been caused by the activity of referenced facility. Bill Breett (Tel. 457-3419), a council person from City of Tombstone, has called and complained that the referenced facility's operation may result in a pollution problem in one of the City wells in Tombstone.

PBR Mineral has been issued a temporary permit which authorizes the treatment of soil contaminated with cyanide in a leaching operation. Mr. Breett indicated that the drinking water well # 1, belonging to City of Tombstone, is contaminated with mercury (Hg) at a concentration of 0.004 mg/l while well #2 only contains Hg of 0.001 mg/l. He also cited that the testing well in PBR mineral facility site did identify a contamination with cyanide and Hg.

He has referred the contamination problem to Drinking Water Compliance Unit. As you know, the temporary permit only lasts for one year. Whether the facility has completed the site cleanup should be investigated to determine the necessity for further action.

If you have questions concerning this facility, please contact Roger Kennett at 257-7720.

cc: Gary Ullinskey
Roger Kennett
John Dahl

ADEQ/ADM/Stock (12/88) — IPS 3171

From William Brett / Complaint 7/13/89

457-3419

Drinking Water Well #1

on June 9, 1989 Cyanide 0.007 2 November, 1988

Hg 0.004 Hg 0.001

Nitrates 2.13

Drinking Water Well #2 Cyanide <0.007 American Ana. Labs.

Hg <0.001

William Brett stated. that they plan to take three connection samples. They have already taken one sample and plan to take the next one and two weeks.

- I told him I would review the monitoring Reports and have Hydrology take a look at it.

The Arizona Daily Star
Tucson, Saturday, July 15, 1989

Metro/State

Accent 7B
Money 15B

B

[redacted]

000307

The Arizona Daily Star
Tucson, Tuesday, July 18, 1989

CITY OF TOMBSTONE, ARIZONA

P.O. BOX 339 TOMBSTONE, ARIZONA 85638 Phone 457-3562

(3)

MEMORANDUM

L-0020-02

TO: MAYOR AND COUNCILMEMBERS includes

FROM: DORIS PULSIFER, CITY CLERK

DATE: July 19, 1989

SUBJECT: Well #1 - Mercury re-sampling #1 results

This is to notify you that I received the results yesterday at approximately 4:15 p.m. of the first re-sampling taken on July 11 for the mercury level at Well #1. The results per my telephone conversation with Lynn from American Analytical Laboratories was 0.001 which is below the maximum level. I have already notified the State and County Health Departments, and requested that a hard copy of the results be forwarded to them directly from the lab.

The second re-sampling is scheduled for today (July 19, 1989) at approximately 10:30 a.m.

DP

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JUL 28 1989
ADEQ — OWQ
COMPLIANCE SECTION

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
INORGANIC CHEMICAL ANALYSIS REPORTING FORM

Sample No: 001222-01

Loc. Code:

PWS ID No.
02033
WTR test
FI only

Laboratory No. 00060
AMERICAN ANALYTICAL LABORATORIES
3441 East Milber Street
Tucson AZ 85714

Date Rec'd.
07/11/89

Sampler
C. VALENZUELA

Water System Name
CITY OF TOMBSTONE

Sampling Point
WELL #1

Sample Date
07/11/89

Sampling Time

Sample Type
Routine (D)
Check Sample(C)
X Special (S)

Location Type
X Single Source
Blended Sources
Lab Composite

Supply
X Well
Surface

Analysis Date
07/19/89

Analysis Method	Contaminant Name		(MCL)	Analysis Results	Exceeds
DEQ01	ARSENIC	EPA 206.3	0.05000	NA	
DEQ01	BARIUM	EPA 208.1	1.00000	NA	
DEQ01	CADMIUM	EPA 213.1	0.01000	NA	
DEQ01	CHROMIUM	EPA 218.3	0.05000	NA	
DEQ01	FLUORIDE	EPA 340.2	1.40000	NA	
DEQ01	LEAD	EPA 239.1	0.05000	NA	
DEQ01	MERCURY	EPA 245.1	0.00200	0.001	
DEQ01	NITRATE (N)	EPA 325.1	10.00000	9.60	
DEQ01	SELENIUM	EPA 270.3	0.01000	NA	
DEQ01	SILVER	EPA 272.1	0.05000	NA	
DEQ01	ALKALINITY	EPA 401		NA	
DEQ01	CALCIUM	EPA 215.1		NA	
DEQ01	CHLORIDE	EPA 325.3		NA	
DEQ01	COPPER	EPA 220.1		NA	
DEQ01	HARDNESS	EPA 130.2		NA	
DEQ01	IRON	EPA 236.1		NA	
DEQ01	MAGNESIUM	EPA 242.1		NA	
DEQ01	MANGANESE	EPA 243.1		NA	
DEQ01	PH	EPA 150.1		NA	
DEQ01	SODIUM	EPA 373.1		NA	
DEQ01	SULFATE	EPA 375.4		NA	
DEQ01	TOT DISS SOLIDS	EPA 160.1		NA	
DEQ01	ZINC	EPA 289.1		NA	
DW01	DW PRIMARY PARAMETERS			0	
DW02	DW SECONDARY PARAMETERS			0	

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Sampler's Comments or Instructions

Lab's Comments or Instructions
CYANIDE DETERMINATION: <0.007 MG/L

Analyst J.A.P. ACB

000310

(4)

American Analytical Laboratories

LABORATORY ANALYSIS REPORT

Code: TOMBST
CITY OF TOMBSTONE
. O. BOX 339
TOMBSTONE, AZ 85638-

SAMPLE INFORMATION
Sample..: 000972-01
Clnt Smp:
Descript: ~~DRINKING~~ WATER
Location: WELL #1
Samp D/T: 06/09/89 09:40
Sampler.: ~~C. VALENZUELA~~
Trans By: R. SMITH
Recvd By: A. PORR
Date Rcv: 06/09/89
Date Rpt: 06/28/89

Analysis			MDL	Results
335.2	CN	CYANIDES, TOTAL		<0.007
245.1	Hg	MERCURY		0.004
352.1	NO3	NITRATE		2.13

water test for information only

(1990)

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ADEQ — OWQ
COMPLIANCE SECTION

Comments:
L units are MG/L unless otherwise specified.
ND means analyte not detected.
MDL is the Method Detection Limit.

Analyst(s)

000311

6585 07
SPECIMEN NO.

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

RECEIVED
JUL 19 1989

06/09/89
DATE REC'D AT LAB

ADEQ — OWQ
COMPLIANCE SECTION

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 06/07/89 Sample Time 11:00 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By:

RECEIVED
JUL 19 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.010 ,	Endrin[a]	P39390,	. ,
Barium +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0097 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	10.1 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	< 0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	76. ,		,	. ,
Chloride	P00940,	36. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	20. ,	— Count Error[b]	P01502,	. ,
Manganese +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.8 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
205 North Central
Phoenix, Arizona 85004

Comments: _____

Analysis Date 07/17/89

Analyst _____

000312

Gr ndwater Quality Protection Perr 't

Self-Monitoring Report Form
Arizona Department of Health Services

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JUL 1 0 1989
ADEQ — OWQ
COMPLIANCE SECTION

658503
SPECIMEN NO.

06/09/89
DATE REC'D AT LAB

ab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
817 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 05/31/89 Sample Time 2:15 p.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019

Collected By:

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JUL 1 9 1989
ADEQ — OWQ
COMPLIANCE SECTION

ADHS Use Only

S C .

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.010	Endrin[a]	P39390,	.
Barium +	P01007,	.	Lindane[a]	P39782,	.
Cadmium +	P01027,	.	MethoxyChlor[a]	P39480,	.
Chromium +	P01034,	.	Toxaphene[a]	P39400,	.
Lead +	P01051,	0.010	2,4-D[a]	P39730,	.
Mercury +	P71900,	< 0.001	2,4,5-TP Silvex[a]	P39045,	.
Nitrate(N)	P00620,	9.9	TTHM[a]	P82080,	.
Selenium +	P01147,	.			.
Silver +	P01077,	< 0.02	Cyanide, Total		0.02
Fluoride	P00951,	.	Cyanide, Free		0.02
		.			.
Alkalinity	P00410,	.			.
Calcium	P00916,	74.			.
Chloride	P00940,	34.			.
Copper +	P01042,	.			.
Hardness	P00900,	.	Radium-226/228[b]	P11503,	.
Iron +	P01045,	.	Gross Alpha, Tot[b]	P01501,	.
Magnesium	P00927,	19.	— Count Error[b]	P01502,	.
Manganese +	P01055,	.	Beta Activity[b]	P03501,	.
pH	P00403,	7.7	Cesium-134[b]	P28414,	.
Sodium	P00929,	.	Iodine-131[b]	P28301,	.
Sulfate	P00945,	.	Strontium-90/89[b]	P01082,	.
TDS	P00500,	.	Tritium[b]	P82126,	.
Zinc +	P01092,	.	Uranium[b]	P22706,	.

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

< = less than the detection limit given

nd 3 copies of completed form to:
izona Department of Health Services
fice of Waste and Water Quality Mgmt.
mpliance Section
om 304
5 North Central
oenix, Arizona 85004

Comments:

Analysis Date 07/17/89

Analyst

000313

12-7-88
DATE REC'D AT LAB

Lab Name & Address — LAB ID NO. 00048

Smith & Smith Environmental Cons.
999 E. Fry Blvd. Suite 202
Sierra Vista, Arizona 85635

ADHS Permit No. #G-0020-02 PBR Minerals permit (for min.)

Sample Location T.E.I. WELL #2

Facility Name & Mailing Address

P.B.R. Minerals — Known as
Attn: Gary Lindroos
950 Skyline Drive, P.O.Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 12-7-88 Sample Time 0720

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)

Parameter Code: P72019

Collected By: RVB, GL

ADHS Use Only

SC.

Parameter Name*	Biorel Parameter Number	Laboratory Analysis Results	Parameter Name*	Biorel Parameter Number	Laboratory Analysis Res
Arsenic	P01002,	,	Endrin[a]	P39390,	
Barium	P01007,	,	Lindane[a]	P39782,	
Cadmium	P01027,	,	MethoxyChlor[a]	P39480,	
Chromium	P01034,	,	Toxaphene[a]	P39400,	
Lead	P01051,	,	2,4-D[a]	P39730,	
Mercury	P71900,	0.0123	2,4,5-TP Silvex[a]	P39045,	
Nitrate(N)	P00620,	2.37	TTHM[a]	P82080,	
Selenium	P01147,	,		,	
Silver	P01077,	,	TOTAL CYANIDE	mg/L	0.12
Fluoride	P00951,	,	FREE CYANIDE	mg/L	< 0.01
	,	,		,	
Alkalinity	P00410,	,		,	
Calcium	P00916,	,		,	
Chloride	P00940,	,		,	
Copper	P01042,	,		,	
Hardness	P00900,	,	Radium-226/228[b]	P11503,	
Iron	P01045,	,	Gross Alpha, Tot[b]	P01501,	
Magnesium	P00927,	,	— Count Error[b]	P01502,	
Manganese	P01055,	,	Beta Activity[b]	P03501,	
pH	P00403,	,	Cesium-134[b]	P28414,	
Sodium	P00929,	,	Iodine-131[b]	P28301,	
Sulfate	P00945,	,	Strontium-90/89[b]	P01082,	
TDS	P00500,	,	Tritium[b]	P82126,	
Zinc	P01092,	,	Uranium[b]	P22706,	

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

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JUL 28 1989
ADEQ OWQ COMPLIANCE SECTION

Send 3 copies of completed form to:

Office of Waste and Water Quality Mgmt.
Compliance Section
Room 304
2005 North Central
Phoenix, Arizona 85004

Comments:

Analysis Date 12-15-88

Analyst DHO, RVB

000314

(3)

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Since July 23, 1987
REF#: 245

EVAN MECHAM, GOVERNOR
Gerald H. Teletzke, Ph.D., Director

Certified Mail
Return Receipt Requested

Gary Lindroos
Cochise Silver
P.O. Box 158
Tombstone, Arizona 85638

Dear Mr. Lindroos:

We have received the analytical results, from Smith and Smith Laboratories, of your June 16, 1987 sampling. We are quite concerned that the laboratory results indicate 0.0011 mg/l of mercury in Tombstone City well #1 and 0.001 mg/l of mercury in TEI well #1. These results are the first indication of mercury in these wells. In order to assess the veracity of these results the Department is requesting that Cochise Silver resample the Tombstone City well #1, TEI wells #1, and #2 for mercury, cyanide, and nitrate. We are requesting that these samples be split and then taken to two different certified laboratories. We are requesting that these samples receive priority status. Additionally we are requesting that you extend your traditional courtesy to a representative of the Department's Southern Regional Office who will be visiting your facility to sample TEI wells #1, #2, and #3. This representative will also sample all the Tombstone City wells at this time.

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ADEQ — OWQ
COMPLIANCE SECTION

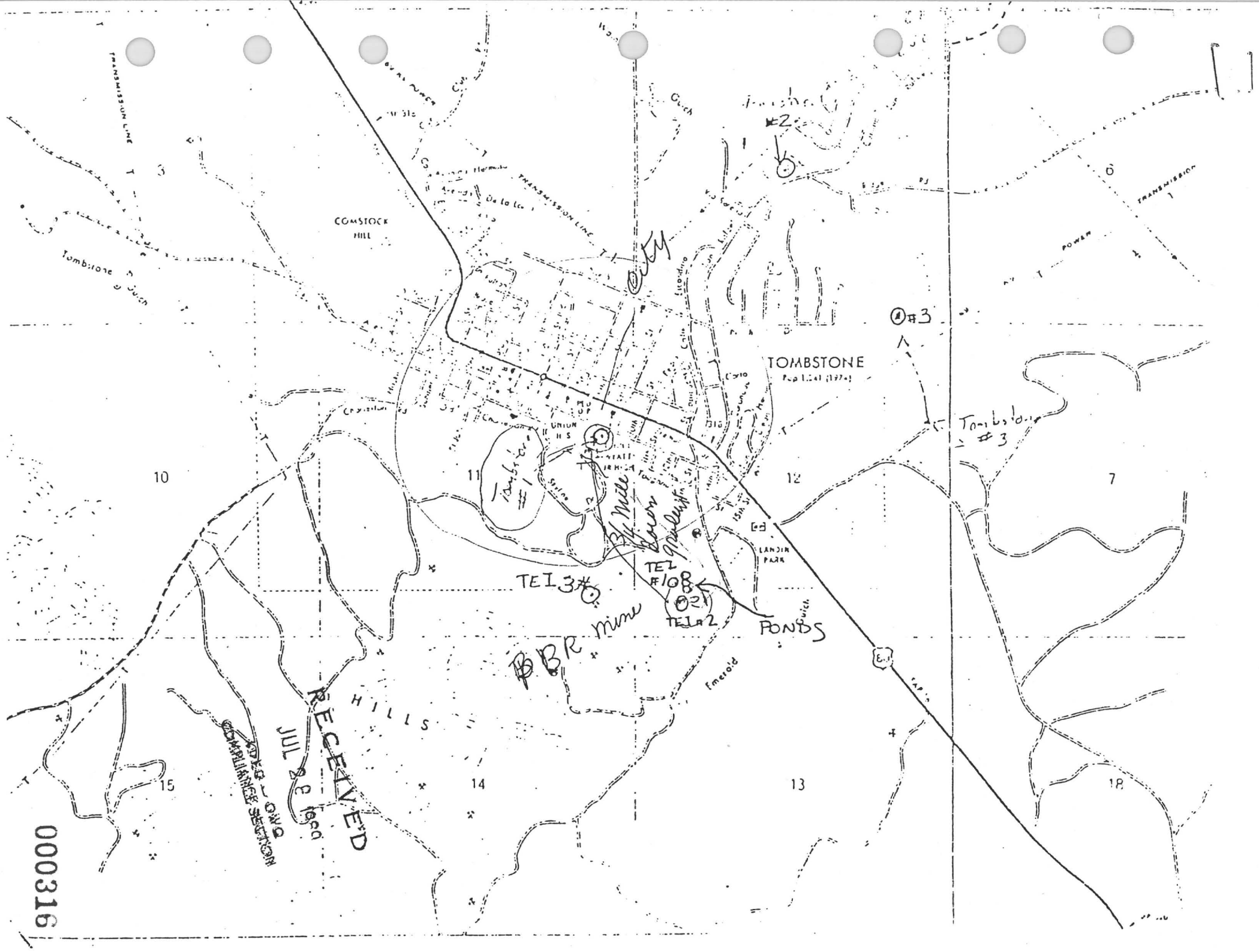
Enclosed for your information are the results of the Department's samples of February 23, 1987. These results correspond quite well with the data submitted by Cochise Silver. If you have any questions or comments please contact me at 257-6818.

Sincerely,

James E. Curlett
Water Pollution Compliance Unit

JEC:lm

cc: James Maston, Southern Regional Office
Robert Manuri, Manager, Field Services Station, ADEQ
Sarah Mapes, Manager, Compliance Section, ADEQ
Roger Kennett, Hydrology
Ronald L. Miller, Ph. d., ADEQ
Alex Gradillas Mayor of Tombstone
Carol Mordhorst Director Cochise Co. Health Dept.
David Baron, Center for Law in the Public Interest
Nancy Jamison, Civil Division, Attorney General's Office



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JUL 28 1980
ADEQ - OWQ
COMPLIANCE SECTION

000316

William Brett 7/27/89

Called to find out

American Analytical
7/11/89 taken
7/19/89 analysis
Hg 0.001
Nitrate 9.60

Gordon Davis

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

July 28, 1989
Ref.#257

TO: Jim Maston, Manager
Southern Regional Office

FROM: David H. Woodruff, Manager DHW
Water Pollution Compliance Unit

RE: PBR Minerals - Groundwater Quality Protection Permit #G-0020-02

Do to the recent local concern about pollution of Tombstone drinking water well #1, the present compliance status with the above referenced Groundwater Permit is needed. This memo is to request that the Southern Regional Office conduct Groundwater Permit compliance inspection on the PBR Minerals activities. Enclosed is a copy of the Permit and other information contained in the WPCU central files.

DHW:rc

000318

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

July 28, 1989
Ref.#256

TO: Debra Daniel, Manager
State Permits Hydrology Unit

FROM: David H. Woodruff, Manager DHW
Water Pollution Compliance Unit

RE: PBR Minerals - Groundwater Quality Protection Permit
#G-0020-02

Do to the recent local concern about pollutions of the Tombstone drinking water well #1, accuracy of the testing results reported to the Safe Drinking Water Unit and the WPCU is important. This memo is to request that a groundwater monitoring audit be conducted at the PBR Minerals site and on the Tombstone drinking water wells. I have forwarded a copy of the Groundwater Permit and other information contained in the WPCU central files to SRO.

DHW:rc

ADEQ/ADM/Stock (Rev. 4-87)

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

DATE: Aug. 1, 1989

TO: Bill Wiley, Manager
Groundwater Hydrology Unit

THRU: Debra Daniel, Manager
State Permits Hydrology Unit

FROM: James DuBois, Hydrologist
State Permits Hydrologu Unit

RE: City of Tombstone Municipal Well #1 and Mining Impact on Aquifer at PBR Minerals

Tombstone Water Supply Sampling

The City of Tombstone water supply consists primarily of two municipal wells and two surface water supply lines from canyons in the Huachuca Mountains. City personnel monitor Municipal Well #1 on a monthly basis for cyanide, nitrate, and mercury, because of their concern about mine impacts on the aquifer.

A well sample taken recently (6-9-89) and analyzed by American Analytical yielded a mercury level of 0.004 mg/l, or twice the drinking water standard. Concommitant sampling at surface water indicated that the supply from Miller Canyon contained 0.002 mg/l mercury. All other constituents analyzed were well below standards and action levels. The other city well and other surface supply tested below primary MCL's for constituents tested. A subsequent confirmation sample of Municipal Well #1 by the City of tombstone has shown a mercury level at, or below, the detection limit of 0.001 mg/l (phone results to ADEQ only).

PBR Minerals

THE PBR Minerals facility, formerly known as Tombstone Exploration, Inc. (TEI) and Cochise Silver Mines, is a precious metals/cyanide heap leach operation. While the property is immediately adjacent to the city limits, the location of solution processing is approximately 2500-3000 ft. southeast of Tombstone's Municipal Well #1. (See attached map.)

A brief history of this site is given here:

1979 - T.E.I. begins heap leach operation
1983 - Surface spill of cyanide-laden tailings into Emerald Gulch. Subsequent cleanup.
July, 1984 - Cyanide level of 93.9 mg/l discovered in Monitor Well #2 - leaking pond suspected.
April, 1985 - GWQPP application requested by ADHS. T.E.I. files for bankruptcy.
April, 1986 - Cochise Silver Mines submits GWQPP proposal.
May, 1986 - Earliest detection of Hg in Monitor Well #2 of 0.011 mg/l.
August, 1986- Second GWQPP proposal submitted.
Jan, 1987 - GWQPP signed for cleanup of contaminated soils and tailings and removal of leaching ponds.
April, 1987 - Facility operating as Cochise Silver Mines.

Good (Reasonable) summary
of work expand.

May, 1988 - Temporary GWQPP issued to PBR Minerals as new owner.
July, 1988 - DEQ personnel sample soils to verify cleanup. Additional excavation recommended.
Jan, 1989 - PBR Minerals issued a GWQPP for expanded operation of a new cyanide leach facility.

The source of cyanide and nitrate contamination in Monitor Well #1 is believed to have been leakage from ponds. Indeed, when Cochise Silver Mines excavated contaminated soils beneath one of the clay-lined ponds an abandoned mine shaft was discovered which may have been a conduit for contaminants. The source of mercury in Monitor Well #2 is still unresolved - mercury was not used at the operation and was not present in significant quantities in leachate.

Closure of the ponds operated by T.E.I. and Cochise Silver Mines has been partially completed. Some soil contamination remains - DEQ sampling in July, 1988 found 6 out of 16 samples exceeding the soil cleanup level for cyanide. However, the main sources of concentrated contaminants, the leaking ponds, have been removed.

Hydrology

The aquifer is fractured limestone. Water table lies at approximately 500 feet below the surface. The area beneath the PBR site and along the southwest side of the City of Tombstone is honeycombed with mine workings both above and below water table. Water table gradient and flow rates are poorly defined because of the fracture flow setting. Monitor well construction details are lacking, and we don't know whether the wells are completed in fracture zones or mine workings. Well depth and screened intervals are not described in our files. In summary, the hydrologic setting presents very unpredictable conditions such that monitor wells provide very little assurance that contaminants are not migrating.

PBR Minerals operates Monitor Well #2 as a supply well for their mine. They maintain that this well provides a pumpback system for contaminant containment. Hydrologically, the effectiveness of the containment of the contaminant plume has not been demonstrated.

Other Relevant Information

- Municipal Well #1 has a history of being free of mercury with the exception of one-analysis on 6-16-87 that showed 0.0011 mg/l.

- City of Tombstone blends their water in a reservoir so that dilution with low mercury sources has protected the public from exceedance of drinking water standards.

- Design of the new leach pads at PBR Minerals would meet BADCT and essentially represent a non-discharging facility. Leak detection capability is included.

- Free cyanide in Monitor Well #2 at PBR Minerals has declined from 93.9 mg/l in July, 1984 to a level of approximately 0.01 mg/l in May, 1988.

- On 12-3-87 Monitor Well #3, which had previously been "clean", showed

a mercury level of 0.0166 mg/l, total cyanide of 0.02 mg/l and nitrate of 17.4 mg/l as N.

- Analysis of process water at Cochise Silver Mines showed 0.0001 mg/l mercury as outlined in John Best's memo of 10-27-87.

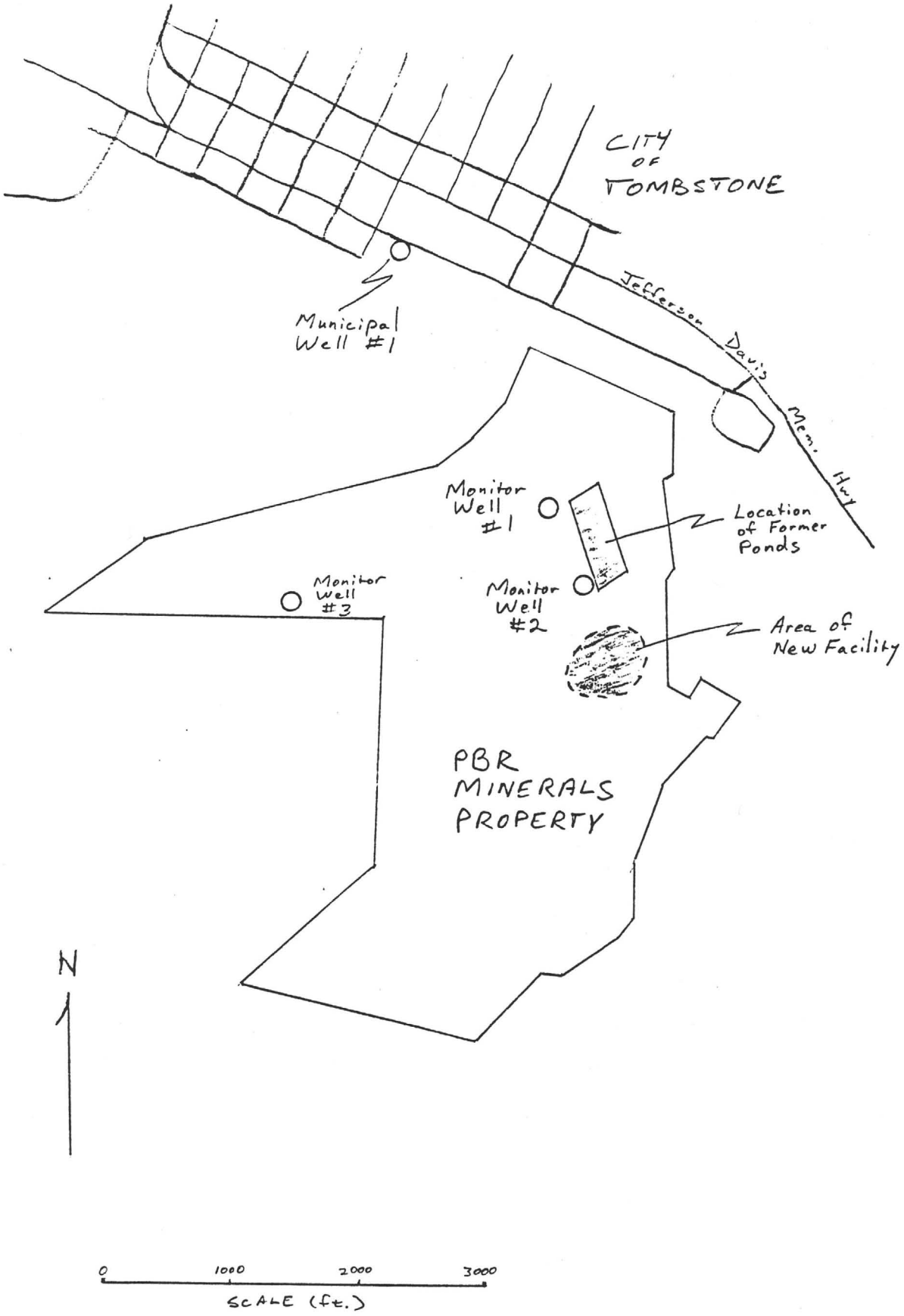
- PBR's current groundwater permit does not require monitoring of Municipal Well #1.

- With time, cyanide breaks down to nitrate in the subsurface. Most cyanide contamination will also have a high nitrate (greater than 5 mg/l) signature. Rising nitrate and dropping cyanide levels at Monitor Well #2 indicate that the initial pulse(s) of concentrated cyanide is degrading.

JD:dl

cc: Ron Miller
Jim Maston
Lyndon Hammon
Roger Kennett

Attachments


CITY OF TOMBSTONE
Jefferson Davis Mem. Hwy
Municipal Well #1
Monitor Well #1
Monitor Well #2
Monitor Well #3
Location of Former Ponds
Area of New Facility
PBR MINERALS PROPERTY
N
0
1000
2000
3000
SCALE (ft.)

RE: G-0020-02

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

(602) 628-5321

ROSE MOFFORD, GOVERNOR
RANDOLPH WOOD, DIRECTOR

November 15, 1989

RECEIVED
NOV 21 1989
ADEQ — OWQ
COMPLIANCE SECTION

Joe Perotti
Public Works Director
City of Tombstone
P.O. Box 339
Tombstone, Arizona 85638

Dear Mr. Perotti:

Enclosed are the results of our sampling of the City of Tombstone water supply sources conducted in July 1989. We performed this sampling because of concerns raised regarding the possible presence of mercury. The following samples are represented in this data:

Lab #	Site
16840	Tombstone Municipal Well #1
16841	Tombstone Municipal Well #1 (Duplicate)
16843	Tombstone Municipal Well #2
16844	Tombstone Municipal Well #3
16845	Input Pipe to City Reservoir from Surface Streams

As you can see, the testing indicates that all sources are within the Primary Drinking Water MCL's for inorganic constituents set by EPA. We found no mercury at concentrations above the detection level of 0.0005 mg/l. In addition, tests conducted by PBR Minerals, Inc. on 5-31-89 and 6-7-89 (copies enclosed) for Municipal Well #1 did not report mercury at a detection limit of 0.001 mg/l.

We found only a trace quantity of cyanide in Municipal Well #1. This level of 0.052 mg/l is slightly above the detection limit of 0.045 mg/l and well below our Health Based Guidance Level of 0.220 mg/l. Also, Nitrate appears in the sampling results at levels approaching the primary MCL of 10.0 mg/l for Municipal Well #1.

The trace quantities of cyanide may be caused by the widespread use, both past and present, of this compound for mineral processing throughout the Tombstone District. Because the levels are quite low and because Municipal Well #1 is drawing water from a large area that likely includes extensive underground workings, it would be difficult to pinpoint a source or sources for this consitituent. Elevated nitrate concentrations in groundwater may result from

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4040 East 29th Street Tucson, Arizona 85711

wastewater disposal, fertilizer application, or cyanide breakdown. Without further information it is difficult to say whether the nitrate emanates from a specific source or represents a regional effect produced by numerous sources.

In conclusion, mercury is not a problem for your drinking water system, and I can only surmise that the previous samples indicating its presence were subject to sampling or laboratory error. While the cyanide and nitrate do not appear to represent an immediate threat to public health, the situation regarding these constituents does warrant continued monitoring. You may wish to test these constituents on a more frequent basis than that required by our Department for drinking water system compliance.

Please feel free to call me with any questions regarding these results.

Sincerely,

James F. DuBois
Hydrologist

c: Jon Dahl/DEQ Drinking Water Compliance Unit
Dave Woodruff/DEQ Water Pollution Compliance Unit
Michael Gregory
Councilman Brett/City of Tombstone
Roger Kennett/DEQ Water Permits Unit
Andy Rendes/DEQ SRO
Gary Lindroos/PBR Minerals, Inc.
Bill Norman/DEQ-PIO
Mary Jo Martin/Cochise County Health Department

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

October 11, 1989

Mud. Well #1

DUBOIS, J.
ADEQ-SRO
4040 E. 29TH. ST.
TUCSON, ARIZONA 85711

TYPE OF SAMPLE: GROUND WATER
Custody: Y
Priority: 2

Sample Name: CITY TOMBSTONE SITE A
Station:
Date Sampled: 07/31/89
Time Sampled: 02:32:00

Special Processing
X Total Recoverable
Dissolved (Filtered)
Leachate/EP Tox
Other:

Note: All samples, including chain-of-custody, will be disposed of within 60 days unless a "Save Sample" form is received by the Chemistry Laboratory. All lab QA is within the limits defined in the SLS QA Manual unless otherwise noted in the report.

Comments: * TEST NOT RUN - TOTAL CYANIDE LESS THAN DETECTION LIMIT FOR FREE CYANIDE OF 1.0 mg/l BY TITRATION METHOD. ** EXCEEDED HOLDING TIME FOR TOTAL KJELDAHL NITROGEN.

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	WATER METHOD REFERENCE	WATER MIN. REPORTING LMT		SOLIDS METHOD REFERENCE	SOLIDS MI REPORTING	
16840	10/06/89	Cyanide, Total	0.052	mg/l	720	EPA 335.2	0.1	mg/l	EPA 9010	0.1	mg/
	10/06/89	Cyanide, Direct (aka 'Free	*		718	Std Meth 412C	0.1	mg/l	Std Meth 412C	0.1	mg/
	10/06/89	Nitrite/Nitrate Total	9.13	mg/l	630	EPA 353.2	0.10	mg-N/l	N/A		
	10/11/89	Alkalinity, Total	Cancelled		410	EPA 310.1	2.0	mg/l	N/A		
	10/06/89	Total Kjeldahl Nitrogen	** 0.07	mg/l	625	EPA 351.2	0.05	mg-N/l	N/A		
	10/06/89	Sulfate	47.1	mg/l	945	EPA 375.2	10	mgSO4/l	N/A		
	10/11/89	Total Dissolved Solids	Cancelled		70300	EPA 160.1	10	mg/l	N/A		
	10/06/89	Carbonate	< 2	mg/l	445	Calculation					
	10/06/89	Bicarbonate	227	mg/l	440	Calculation					
	10/11/89	Chloride	Cancelled		940	Std Meth 407C	1.0	mg/l	N/A		
	10/11/89	Iron	Cancelled		1045/1046	EPA 220.7/236.1	0.10	mg/l	EPA 3010/236.1	50	mg/
	10/06/89	Potassium	3.0	mg/l	937/935	EPA 258.1	0.50	mg/l	EPA 3010/258.1	5	mg/
	10/11/89	Mercury	Cancelled		71900/71890	EPA 245.1	0.0005	mg/l	EPA 7470	0.05	mg/
	10/11/89	Magnesium	Cancelled		927/925	EPA 220.7/242.1	0.500	mg/l	EPA 3010/242.1	50	mg/
	10/11/89	Manganese	Cancelled		1055/1056	EPA 200.7/243.1	0.050	mg/l	EPA 3010/243.1	5	mg/
	10/11/89	Sodium	Cancelled		929/930	EPA 200.7/273.1	5.0	mg/l	EPA 3010/273.1	50	mg/
	10/11/89	Calcium	Cancelled		916/915	EPA 200.7/215.1	1	mg/l	EPA 3010/200.7	2	mg/
		SDW ALL INORGANICS									
	10/06/89	* Alkalinity, Total	186	mg/l	410	EPA 310.1	2.0	mg/l			
	10/06/89	* Alkalinity, Phenol.	< 2	mg/l	415	EPA 310.1	2.0	mg/l			
	10/06/89	* Arsenic	0.013	mg/l	1002/1000	EPA 206.2	0.010	mg/l			
	10/06/89	* Barium	< 0.10	mg/l	1007/1005	EPA 200.7/208.1	0.10	mg/l			
	10/06/89	* Cadmium	< 0.0005	mg/l	1027/1025	EPA 213.2	0.0010	mg/l			
	10/06/89	* Calcium	70.6	mg/l	916/915	EPA 200.7/215.1	1	mg/l			
	10/06/89	* Chloride	35.7	mg/l	940	Std Meth 407C	1.0	mg/l			
	10/06/89	* Chromium	< 0.010	mg/l	1034/1032	EPA 218.2	0.010	mg/l			
	10/06/89	* Copper	< 0.10	mg/l	1042/1040	EPA 220.1/220.2	0.010	mg/l			
	10/06/89	* Fluoride	2.34	mg/l	951	EPA 340.2	0.20	mg/l			
	10/06/89	* Hardness	267	mg/l	900	EPA 130.2	10	mg/l			
	10/06/89	* Iron	< 0.10	mg/l	1045/1046	EPA 200.7/236.1	0.100	mg/l			
	10/06/89	* Lead	0.010	mg/l	1051/1049	EPA 239.2	0.010	mg/l			
	10/06/89	* Magnesium	19.9	mg/l	927/925	EPA 200.7/242.1	0.500	mg/l			

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Reviewed and Approved: TD P.1 of 2
Thomas G. Davis, Manager
Office of Environmental and Analytical Chemistry

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	WATER METHOD REFERENCE	WATER MIN. REPORTING LMT	SOLIDS METHOD REFERENCE	SOLIDS MI REPORTING
16840	10/06/89	* Manganese	< 0.05	mg/l	1055/1056	EPA 200.7/243.1	0.050 mg/l		
	10/06/89	* Mercury	< 0.0005	mg/l	71900/71890	EPA 245.1	0.0005mg/l		
	10/11/89	* Nitrite/Nitrate Total	Cancelled		630	EPA 353.2	0.10 mg-N/l		
	10/06/89	* pH	7.09		403	EPA 150.1	0.1 SU		
	10/06/89	* Selenium	< 0.005	mg/l	1147/1145	EPA 270.2	0.005 mg/l		
	10/06/89	* Silver	< 0.001	mg/l	1077/1075	EPA 272.2	0.001 mg/l		
	10/06/89	* Sodium	34.1	mg/l	929/930	EPA 200.7/273.1	5.0 mg/l		
	10/06/89	* Specific Conductivity	621	umhos/cm2	95	EPA 120.1			
	10/11/89	* Sulfate/SO4	Cancelled		945	EPA 375.2	10 mgSO4/l		
	10/06/89	* Total Dissolved Solid	409	mg/l	70300	EPA 160.1	10 mg/l		
	10/06/89	* Zinc	0.24	mg/l	1092/1090	EPA 289.1	0.05 mg/l		

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Thomas S. Davis, Manager
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ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
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ENVIRONMENTAL QUALITY SHQ

Oct. 19, 1989

DUBOIS, J.
ADEQ-SRC
4040 E. 29TH. ST.
TUCSON, ARIZONA 85711

TYPE OF SAMPLE: GROUND WATER
Custody: Y
Priority: 2

Sample Name: SIX TOMBSTONE el PUMP
Station:
Date Sampled: 07/31/89
Time Sampled: 02:34:00

MUN. WELL #1 (Duplicate)

Special Processing
X Total Recoverable
Dissolved (Filtered)
Leachate/EP Tox
Other:

Note: All samples, including chain-of-custody, will be disposed of within 60 days unless a "Save Sample" form is received by the Chemistry Laboratory. All lab QA is within the limits defined in the SLS QA Manual unless otherwise noted in the report.

Comments: * TEST NOT RUN - TOTAL CYANIDE LESS THAN DETECTION LIMIT FOR FREE CYANIDE OF 1.0 mg/l BY TITRATION METHOD. **EXCEEDED HOLDING TIME FOR TKN. TKN VALUE REPORTED AS MEAN +/- 0.04mg/l

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	WATER METHOD REFERENCE	WATER MIN. REPORTING LMT		SOLIDS METHOD REFERENCE	SOLIDS MIN REPORTING	
16841	10/06/89	Cyanide, Total	0.052*	mg/l	720	EPA 335.2	0.1	mg/l	EPA 9010	0.1	mg/kg
	10/06/89	Cyanide, Direct Titra (Free)	*		718	Std Meth 412D	0.1	mg/l	Std Meth 412D	0.1	mg/kg
	10/06/89	Nitrite/Nitrate Total	8.87	mg/l	630	EPA 353.2	0.10	mg-N/l	N/A		
	10/11/89	Alkalinity, Total	Cancelled		410	EPA 310.1	2.0	mg/l	N/A		
	10/06/89	Total Kjeldahl Nitrogen	** 0.16	mg/l	625	EPA 351.2	0.05	mg-N/l	N/A		
	10/06/89	Sulfate	46.2	mg/l	945	EPA 375.2	10	mgSO4/l	N/A		
	10/11/89	Total Dissolved Solids	Cancelled		70300	EPA 160.1	10	mg/l	N/A		
	10/06/89	Carbonate	< 2	mg/l	445	Calculation					
	10/06/89	Bicarbonate	233	mg/l	440	Calculation					
	10/11/89	Chloride	Cancelled		940	Std Meth 407C	1.0	mg/l	N/A		
	10/11/89	Iron	Cancelled		1045/1046	EPA 220.7/236.1	0.10	mg/l	EPA 3010/236.1	50	mg/kg
	10/06/89	Potassium	3.9	mg/l	937/935	EPA 258.1	0.50	mg/l	EPA 3010/258.1	5	mg/kg
	10/11/89	Mercury	Cancelled		71900/71890	EPA 245.1	0.0005	mg/l	EPA 7470	0.05	mg/kg
	10/11/89	Magnesium	Cancelled		927/925	EPA 220.7/242.1	0.500	mg/l	EPA 3010/242.1	50	mg/kg
	10/11/89	Manganese	Cancelled		1055/1056	EPA 200.7/243.1	0.050	mg/l	EPA 3010/243.1	5	mg/kg
	10/11/89	Sodium	Cancelled		929/930	EPA 200.7/273.1	5.0	mg/l	EPA 3010/273.1	50	mg/kg
	10/11/89	Calcium	Cancelled		916/915	EPA 200.7/215.1	1	mg/l	EPA 3010/200.7	1	mg/kg
		SDW ALL INORGANICS									
	10/06/89	* Alkalinity, Total	191	mg/l	410	EPA 310.1	2.0	mg/l			
	10/06/89	* Alkalinity, Phenol.	< 2	mg/l	415	EPA 310.1	2.0	mg/l			
	10/06/89	* Arsenic	0.012	mg/l	1002/1000	EPA 206.2	0.010	mg/l			
	10/06/89	* Barium	< 0.10	mg/l	1007/1005	EPA 200.7/208.1	0.10	mg/l			
	10/06/89	* Cadmium	< 0.0005	mg/l	1027/1025	EPA 213.2	0.0010	mg/l			
	10/06/89	* Calcium	72.9	mg/l	916/915	EPA 200.7/215.1	1	mg/l			
	10/06/89	* Chloride	34.9	mg/l	940	Std Meth 407C	1.0	mg/l			
	10/06/89	* Chromium	< 0.010	mg/l	1034/1032	EPA 218.2	0.010	mg/l			
	10/06/89	* Copper	< 0.10	mg/l	1042/1040	EPA 220.1/220.2	0.010	mg/l			
	10/06/89	* Fluoride	2.32	mg/l	951	EPA 340.2	0.20	mg/l			
	10/06/89	* Hardness	269	mg/l	900	EPA 130.2	10	mg/l			
	10/06/89	* Iron	< 0.10	mg/l	1045/1046	EPA 200.7/236.1	0.100	mg/l			
	10/06/89	* Lead	0.019	mg/l	1051/1049	EPA 239.2	0.010	mg/l			
	10/06/89	* Magnesium	19.1	mg/l	927/925	EPA 200.7/242.1	0.500	mg/l			

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Reviewed and Approved: TD Pilafz
Thomas G. Davis, Manager

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	WATER METHOD REFERENCE	WATER MIN. REPORTING LMT	SOLIDS METHOD REFERENCE	SOLIDS MIN. REPORTING
16841	10/06/89	* Manganese	< 0.05	mg/l	1055.1056	EPA 200.7/243.1	0.050	mg/l	
	10/06/89	* Mercury	< 0.0005	mg/l	71900/71890	EPA 245.1	0.0005	mg/l	
	10/11/89	* Nitrite/Nitrate Total	Cancelled		630	EPA 353.2	0.10	mg-N/l	
	10/06/89	* pH	7.08		403	EPA 150.1	0.1	SU	
	10/06/89	* Selenium	< 0.005	mg/l	1147/1145	EPA 270.2	0.005	mg/l	
	10/06/89	* Silver	< 0.001	mg/l	1077/1075	EPA 272.2	0.001	mg/l	
	10/06/89	* Sodium	36.7	mg/l	929/930	EPA 200.7/273.1	3.0	mg/l	
	10/06/89	* Specific Conductivity	621	umhos/cm2	95	EPA 120.1			
	10/11/89	* Sulfate/SO4	Cancelled		945	EPA 375.2	10	mgSO4/l	
	10/06/89	* Total Dissolved Solid	403	mg/l	70300	EPA 160.1	10	mg/l	
	10/06/89	* Zinc	0.11	mg/l	1092/1090	EPA 289.1	0.05	mg/l	

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Reviewed and Approved: Thomas Davis
Thomas E. Davis, Manager
Office of Environmental and Analytical Chemistry

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ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

October 4, 1989

DUBOIS, J.
ADEQ-SRO
4040 E. 29TH. ST.
TUCSON, ARIZONA 85711

TYPE OF SAMPLE: GROUND WATER
Custody: Y
Priority: 2

Sample Name: CITY TOMBSTONE #2
Station:
Date Sampled: 07/31/89
Time Sampled: 02:50:00

Special Processing
X Total Recoverable
Dissolved (Filtered)
Leachate/EP Tox
Other:

Note: All samples, including chain-of-custody, will be disposed of within 60 days unless a "Save Sample" form is received by the Chemistry Laboratory.

Comments: * TEST NOT RUN - TOTAL CYANIDE LESS THAN DETECTION LIMIT FOR FREE CYANIDE OF 1.0 mg/l BY TITRATION METHOD.

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	METHOD FOR WATERS	DET. LIMITS FOR WATERS		METHOD FOR SOLIDS	DET. LIMITS FOR SOLIDS	
16843	10/04/89	Cyanide, Total	< 0.045	mg/l	720	EPA 335.2	0.1	mg/l	EPA 9010	0.1	mg/kg
	10/04/89	Cyanide, Direct (aka 'Free	*		718	Std Meth 412C	0.1	mg/l	Std Meth 412C	0.1	mg/kg
	10/04/89	Nitrite/Nitrate Total	2.84	mg/l	630	EPA 353.2	0.10	mg-N/l	N/A		
	10/04/89	Alkalinity, Total	Cancelled		410	EPA 310.1	2.0	mg/l	N/A		
	10/04/89	Total Kjeldahl Nitrogen	< 0.05	mg/l	625	EPA 351.2	0.05	mg-N/l	N/A		
	10/04/89	Sulfate	< 10.0	mg/l	945	EPA 375.2	10	mgSO4/l	N/A		
	10/04/89	Total Dissolved Solids	Cancelled		70300	EPA 160.1	10	mg/l	N/A		
	10/04/89	Carbonate	< 2	mg/l	445	Calculation					
	10/04/89	Bicarbonate	211	mg/l	440	Calculation					
	10/04/89	Chloride	Cancelled		940	Std Meth 407C	1.0	mg/l	N/A		
	10/04/89	Iron	Cancelled		1045/1046	EPA 220.7/236.1	0.10	mg/l	EPA 3010/236.1	30	mg/kg
	10/04/89	Potassium	2.6	mg/l	937/935	EPA 258.1	0.50	mg/l	EPA 3010/258.1	5	mg/kg
	10/04/89	Mercury	Cancelled		71900/71890	EPA 245.1	0.0005	mg/l	EPA 7470	0.05	mg/kg
	10/04/89	Magnesium	Cancelled		927/925	EPA 220.7/242.1	0.500	mg/l	EPA 3010/242.1	50	mg/kg
	10/04/89	Manganese	Cancelled		1055/1056	EPA 200.7/243.1	0.050	mg/l	EPA 3010/243.1	5	mg/kg
	10/04/89	Sodium	Cancelled		929/930	EPA 200.7/273.1	5.0	mg/l	EPA 3010/273.1	50	mg/kg
	10/04/89	Calcium	Cancelled		916/915	EPA 200.7/215.1	1	mg/l	EPA 3010/200.7	2	mg/kg
		SDW ALL INORGANICS									
	10/04/89	* Alkalinity, Total	173	mg/l	410	EPA 310.1	2.0	mg/l			
	10/04/89	* Alkalinity, Phenol.	< 2	mg/l	415	EPA 310.1	2.0	mg/l			
	10/04/89	* Arsenic	< 0.010	mg/l	1002/1000	EPA 206.2	0.010	mg/l			
	10/04/89	* Barium	0.23	mg/l	1007/1005	EPA 200.7/208.1	0.10	mg/l			
	10/04/89	* Cadmium	< 0.0005	mg/l	1027/1025	EPA 213.2	0.0010	mg/l			
	10/04/89	* Calcium	43.9	mg/l	916/915	EPA 200.7/215.1	1	mg/l			
	10/04/89	* Chloride	2.3	mg/l	940	Std Meth 407C	1.0	mg/l			
	10/04/89	* Chromium	< 0.010	mg/l	1034/1032	EPA 218.2	0.010	mg/l			
	10/04/89	* Copper	< 0.10	mg/l	1042/1040	EPA 220.1/220.2	0.010	mg/l			
	10/04/89	* Fluoride	0.28	mg/l	951	EPA 340.2	0.20	mg/l			
	10/04/89	* Hardness	174	mg/l	900	EPA 130.2	10	mg/l			
	10/04/89	* Iron	< 0.10	mg/l	1045/1046	EPA 200.7/236.1	0.100	mg/l			
	10/04/89	* Lead	< 0.010	mg/l	1051/1049	EPA 239.2	0.010	mg/l			
	10/04/89	* Magnesium	16.0	mg/l	927/925	EPA 200.7/242.1	0.500	mg/l			

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Reviewed and Approved: TD P. 1 of 2
Thomas G. Davis, Manager
Office of Environmental and Analytical Chemistry

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ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	METHOD FOR WATERS	DET. LIMITS FOR WATERS	METHOD FOR SOLIDS	DET. LIMITS FOR SOLIDS
16843	10/04/89	* Manganese	< 0.05	mg/l	1055/1056	EPA 200.7/243.1	0.050 mg/l		
	10/04/89	* Mercury	< 0.0005	mg/l	71900/71890	EPA 245.1	0.0005mg/l		
	/04/89	* Nitrite/Nitrate Total	Cancelled		630	EPA 353.2	0.10 mg-N/l		
	10/04/89	* pH	7.17		403	EPA 150.1	0.1 SU		
	10/04/89	* Selenium	< 0.005	mg/l	1147/1145	EPA 270.2	0.005 mg/l		
	10/04/89	* Silver	< 0.001	mg/l	1077/1075	EPA 272.2	0.001 mg/l		
	10/04/89	* Sodium	9.2	mg/l	929/930	EPA 200.7/273.1	5.0 mg/l		
	10/04/89	* Specific Conductivity	354	umhos/cm2	95	EPA 120.1			
	10/04/89	* Sulfate/SO4	Cancelled		945	EPA 375.2	10 mgSO4/l		
	10/04/89	* Total Dissolved Solid	229	mg/l	70300	EPA 160.1	10 mg/l		
	10/04/89	* Zinc	< 0.05	mg/l	1092/1090	EPA 289.1	0.05 mg/l		

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iewed and Approved: Thomas Davis P. 2 of 2
nas G. Davis, Manager

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

October 4, 1989

DUBOIS, J.
ADEQ-SRO
4040 E. 29TH. ST.
TUCSON, ARIZONA 85711

TYPE OF SAMPLE: GROUND WATER
Custody: Y
Priority: 2

Sample Name: CITY TOMBSTONE #3
Station:
Date Sampled: 07/31/89
Time Sampled: 03:08:00

Special Processing
X Total Recoverable
Dissolved (Filtered)
Leachate/EP Tox
Other:

Note: All samples, including chain-of-custody, will be disposed of within 60 days unless a "Save Sample" form is received by the Chemistry Laboratory.

Comments: * TEST NOT RUN - TOTAL CYANIDE LESS THAN DETECTION LIMIT FOR FREE CYANIDE OF 1.0 mg/l BY TITRATION METHOD.

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	METHOD FOR WATERS	DET. LIMITS FOR WATERS		METHOD FOR SOLIDS	DET. LIMITS FOR SOLIDS	
16844	10/04/89	Cyanide, Total	< 0.045	mg/l	720	EPA 335.2	0.1	mg/l	EPA 9010	0.1	mg/kg
	10/04/89	Cyanide, Direct (aka 'Free	*		718	Std Meth 412C	0.1	mg/l	Std Meth 412C	0.1	mg/kg
	/04/89	Nitrite/Nitrate Total	3.34	mg/l	630	EPA 353.2	0.10	mg-N/l	N/A		
	10/04/89	Alkalinity, Total	Cancelled		410	EPA 310.1	2.0	mg/l	N/A		
	10/04/89	Total Kjeldahl Nitrogen	< 0.05	mg/l	625	EPA 351.2	0.05	mg-N/l	N/A		
	10/04/89	Sulfate	< 10.0	mg/l	945	EPA 375.2	10	mgSO4/l	N/A		
	10/04/89	Total Dissolved Solids	Cancelled		70300	EPA 160.1	10	mg/l	N/A		
	10/04/89	Carbonate	< 2	mg/l	445	Calculation					
	10/04/89	Bicarbonate	188	mg/l	440	Calculation					
	10/04/89	Chloride	Cancelled		940	Std Meth 407C	1.0	mg/l	N/A		
	10/04/89	Iron	Cancelled		1045/1046	EPA 220.7/236.1	0.10	mg/l	EPA 3010/236.1	50	mg/kg
	10/04/89	Potassium	3.0	mg/l	937/935	EPA 258.1	0.50	mg/l	EPA 3010/258.1	5	mg/kg
	10/04/89	Mercury	Cancelled		71900/71890	EPA 245.1	0.0005	mg/l	EPA 7470	0.05	mg/kg
	10/04/89	Magnesium	Cancelled		927/925	EPA 220.7/242.1	0.500	mg/l	EPA 3010/242.1	50	mg/kg
	10/04/89	Manganese	Cancelled		1055/1056	EPA 200.7/243.1	0.050	mg/l	EPA 3010/243.1	5	mg/kg
	10/04/89	Sodium	Cancelled		929/930	EPA 200.7/273.1	5.0	mg/l	EPA 3010/273.1	50	mg/kg
		SDW ALL INORGANICS									
	10/04/89	* Alkalinity, Total	154	mg/l	410	EPA 310.1	2.0	mg/l			
	10/04/89	* Alkalinity, Phenol.	< 2	mg/l	415	EPA 310.1	2.0	mg/l			
	10/04/89	* Arsenic	0.014	mg/l	1002/1000	EPA 206.2	0.010	mg/l			
	10/04/89	* Barium	0.26	mg/l	1007/1005	EPA 200.7/208.1	0.10	mg/l			
	10/04/89	* Cadmium	< 0.0005	mg/l	1027/1025	EPA 213.2	0.0010	mg/l			
	04/89	* Calcium	33.8	mg/l	916/915	EPA 200.7/215.1	1	mg/l			
	10/04/89	* Chloride	3.0	mg/l	940	Std Meth 407C	1.0	mg/l			
	10/04/89	* Chromium	< 0.010	mg/l	1034/1032	EPA 218.2	0.010	mg/l			
	10/04/89	* Copper	< 0.10	mg/l	1042/1040	EPA 220.1/220.2	0.010	mg/l			
	10/04/89	* Fluoride	0.43	mg/l	951	EPA 340.2	0.20	mg/l			
	10/04/89	* Hardness	157	mg/l	900	EPA 130.2	10	mg/l			
	04/89	* Iron	2.21	mg/l	1045/1046	EPA 200.7/236.1	0.100	mg/l			
	10/04/89	* Lead	< 0.010	mg/l	1051/1049	EPA 239.2	0.010	mg/l			
	10/04/89	* Magnesium	15.8	mg/l	927/925	EPA 200.7/242.1	0.500	mg/l			
	10/04/89	* Manganese	0.08	mg/l	1055/1056	EPA 200.7/243.1	0.050	mg/l			

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iewed and Approved: TD Pilot
nas S. Davis, Manager

000332

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	METHOD FOR WATERS	DET. LIMITS FOR WATERS	METHOD FOR SOLIDS	DET. LIMITS FOR SOLIDS
16844	10/04/89	* Mercury	< 0.0005	mg/l	71900/71890	EPA 245.1	0.0005mg/l		
	10/04/89	* Nitrite/Nitrate Total	Cancelled		630	EPA 353.2	0.10 mg-N/l		
	10/04/89	* pH	7.55		403	EPA 150.1	0.1 SU		
	10/04/89	* Selenium	< 0.005	mg/l	1147/1145	EPA 270.2	0.005 mg/l		
	10/04/89	* Silver	< 0.001	mg/l	1077/1075	EPA 272.2	0.001 mg/l		
	10/04/89	* Sodium	14.1	mg/l	929/930	EPA 200.7/273.1	5.0 mg/l		
	10/04/89	* Specific Conductivity	319	umhos/cm2	95	EPA 120.1			
	10/04/89	* Sulfate/SO4	Cancelled		945	EPA 375.2	10 mgSO4/l		
	10/04/89	* Total Dissolved Solid	226	mg/l	70300	EPA 160.1	10 mg/l		
	10/04/89	* Zinc	< 0.05	mg/l	1092/1090	EPA 289.1	0.05 mg/l		
	10/04/89	Calcium	Cancelled		916/915	EPA 200.7/215.1	1 mg/l	EPA 3010/200.7	2 mg/kg

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iewed and Approved: Thomas Davis P.2 of 2
mas S. Davis, Manager
ice of Environmental and Analytical Chemistry

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

October 4, 1989

DUBOIS, J.
ADEQ-SRO
4040 E. 29TH. ST.
TUCSON, ARIZONA 85711

TYPE OF SAMPLE: WATER
Custody: Y
Priority: 2

Sample Name: TOMBSTONE RESERVOIR
Station:
Date Sampled: 07/31/89
Time Sampled: 03:38:00

Special Processing
X Total Recoverable
Dissolved (Filtered)
Leachate/EP Tox
Other:

No All samples, including chain-of-custody, will be disposed of within 60 days unless a "Save Sample" form is received by the Chemistry Laboratory.

Comments: * TEST NOT RUN - TOTAL CYANIDE LESS THAN DETECTION LIMIT FOR FREE CYANIDE OF 1.0 mg/l BY TITRATION METHOD.

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	METHOD FOR WATERS	DET. LIMITS FOR WATERS		METHOD FOR SOLIDS	DET. LIMITS FOR SOLIDS	
16845	10/06/89	Cyanide, Total	< 0.045	mg/l	720	EPA 335.2	0.1	mg/l	EPA 9010	0.1	mg/kg
	10/06/89	Cyanide, Direct (aka 'Free	*		718	Std Meth 412C	0.1	mg/l	Std Meth 412C	0.1	mg/kg
	10/06/89	Nitrite/Nitrate Total	< 0.10	mg/l	630	EPA 353.2	0.10	mg-N/l	N/A		
	10/06/89	Alkalinity, Total	Cancelled		410	EPA 310.1	2.0	mg/l	N/A		
	10/06/89	Total Kjeldahl Nitrogen	0.08	mg/l	625	EPA 351.2	0.05	mg-N/l	N/A		
	10/06/89	Sulfate	13.9	mg/l	945	EPA 375.2	10	mgSO4/l	N/A		
	10/06/89	Total Dissolved Solids	Cancelled		70300	EPA 160.1	10	mg/l	N/A		
	10/06/89	Carbonate	< 2	mg/l	445	Calculation					
	10/06/89	Bicarbonate	210	mg/l	440	Calculation					
	10/06/89	Chloride	Cancelled		940	Std Meth 407C	1.0	mg/l	N/A		
	10/06/89	Iron	Cancelled		1045/1046	EPA 220.7/236.1	0.10	mg/l	EPA 3010/236.1	50	mg/kg
	10/06/89	Potassium	< 0.5	mg/l	937/935	EPA 258.1	0.50	mg/l	EPA 3010/258.1	5	mg/kg
	10/06/89	Mercury	Cancelled		71900/71890	EPA 245.1	0.0005	mg/l	EPA 7470	0.05	mg/kg
	10/06/89	Magnesium	Cancelled		927/925	EPA 220.7/242.1	0.500	mg/l	EPA 3010/242.1	50	mg/kg
	10/06/89	Manganese	Cancelled		1055/1056	EPA 200.7/243.1	0.050	mg/l	EPA 3010/243.1	5	mg/kg
	10/06/89	Sodium	Cancelled		929/930	EPA 200.7/273.1	5.0	mg/l	EPA 3010/273.1	50	mg/kg
	10/06/89	Calcium	Cancelled		916/915	EPA 200.7/215.1	1	mg/l	EPA 3010/200.7	2	mg/kg
		SDW ALL INORGANICS									
	10/06/89	* Alkalinity, Total	172	mg/l	410	EPA 310.1	2.0	mg/l			
	10/06/89	* Alkalinity, Phenol.	< 2	mg/l	415	EPA 310.1	2.0	mg/l			
	10/06/89	* Arsenic	< 0.010	mg/l	1002/1000	EPA 206.2	0.010	mg/l			
	10/06/89	* Barium	< 0.10	mg/l	1007/1005	EPA 200.7/208.1	0.10	mg/l			
	10/06/89	* Cadmium	< 0.0005	mg/l	1027/1025	EPA 213.2	0.0010	mg/l			
	10/06/89	* Calcium	58.4	mg/l	916/915	EPA 200.7/215.1	1	mg/l			
	10/06/89	* Chloride	1.7	mg/l	940	Std Meth 407C	1.0	mg/l			
	10/06/89	* Chromium	< 0.010	mg/l	1034/1032	EPA 218.2	0.010	mg/l			
	10/06/89	* Copper	< 0.10	mg/l	1042/1040	EPA 220.1/220.2	0.010	mg/l			
	10/06/89	* Fluoride	< 0.2	mg/l	951	EPA 340.2	0.20	mg/l			
	10/06/89	* Hardness	190	mg/l	900	EPA 130.2	10	mg/l			
	10/06/89	* Iron	< 0.10	mg/l	1045/1046	EPA 200.7/236.1	0.100	mg/l			
	10/06/89	* Lead	< 0.010	mg/l	1051/1049	EPA 239.2	0.010	mg/l			
	10/06/89	* Magnesium	11.2	mg/l	927/925	EPA 200.7/242.1	0.500	mg/l			

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Reviewed and Approved: TD P. 1 of 2
Thomas S. Davis, Manager

ARIZONA DEPARTMENT OF HEALTH SERVICES

State Laboratory

Jon M. Counts, Dr. P. H., Assistant Director
1520 West Adams, Phoenix, Arizona 85007
(602) 255-1188

-- ANALYTICAL RESULTS --

LAB #	DATE REPORTED	COMPOUND	RESULT		STORET NUMBER	METHOD FOR WATERS	DET. LIMITS FOR WATERS	METHOD FOR SOLIDS	DET. LIMITS FOR SOLIDS
16845	10/06/89	* Manganese	< 0.05	mg/l	1055/1056	EPA 200.7/243.1	0.050 mg/l		
	/06/89	* Mercury	< 0.0005	mg/l	71900/71890	EPA 245.1	0.0005mg/l		
	10/06/89	* Nitrite/Nitrate Total	Cancelled		630	EPA 353.2	0.10 mg-N/l		
	10/06/89	* pH	7.53		403	EPA 150.1	0.1 SU		
	10/06/89	* Selenium	< 0.005	mg/l	1147/1145	EPA 270.2	0.005 mg/l		
	10/06/89	* Silver	< 0.001	mg/l	1077/1075	EPA 272.2	0.001 mg/l		
	10/06/89	* Sodium	< 5.0	mg/l	929/930	EPA 200.7/273.1	5.0 mg/l		
	10/06/89	* Specific Conductivity	345	umhos/cm2	95	EPA 120.1			
	10/06/89	* Sulfate/SO4	Cancelled		945	EPA 375.2	10 mgSO4/l		
	10/06/89	* Total Dissolved Solid	207	mg/l	70300	EPA 160.1	10 mg/l		
	10/06/89	* Zinc	< 0.05	mg/l	1092/1090	EPA 289.1	0.05 mg/l		

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Reviewed and Approved: Thomas Davis P. 2 of 2
Thomas S. Davis, Manager

658503
SPECIMEN NO.

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

06/09/89
DATE REC'D AT LAB

ab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
81 West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☒ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 05/31/89 Sample Time 2:15 p.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019

Collected By:

OHS Use Only

S C

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.010 ,	Endrin[a]	P39390,	. ,
Bari +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.010 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate(N)	P00620,	9.9 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	0.02 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	0.02 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	74. ,		,	. ,
Chlor	P00940,	34. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	19. ,	— Count Error[b]	P01502,	. ,
Mang se +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.7 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

*Units are mg/l unless otherwise noted.

[a]Units are µg/l
[b]Units are pCi/l

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000336

. = less than the detection limit given

nd 3 copies of completed form to:
zona Department of Health Services
ice of Waste and Water Quality Mgmt.
npliance Section
rm 304

Comments:

Analysis Date 07/17/89
Analyst

Groundwater Quality Protection Permit
Self-Monitoring Report Form
Arizona Department of Health Services

658507
SPECIMEN NO.

06/09/89
DATE REC'D AT LAB

Lab Name & Address — LAB ID NO. 0002

Arizona Testing Laboratories
81[illegible] West Madison
Phoenix, Arizona 85007

ADHS Permit No. G-0020-02

Sample Location Tombstone City Well #1

Facility Name & Mailing Address

PBR Minerals, Inc.
Attn: Gary Lindroos
P. O. Box 370
Tombstone, Arizona 85638

SAMPLE COLLECTION INFORMATION

☑ Groundwater ☐ Vadose ☐ Waste Stream ☐ Pond
☐ Other

Sample Date 06/07/89 Sample Time 11:00 a.m.

Depth to Water _____ Feet below land surface
(Groundwater Samples Only)
Parameter Code: P72019

Collected By:

ADHS Use Only

S C

Parameter Name*	Storet Parameter Number	Laboratory Analysis Results	Parameter Name*	Storet Parameter Number	Laboratory Analysis Results
Arsenic +	P01002,	0.010 ,	Endrin[a]	P39390,	. ,
Bari[illegible] +	P01007,	. ,	Lindane[a]	P39782,	. ,
Cadmium +	P01027,	. ,	MethoxyChlor[a]	P39480,	. ,
Chromium +	P01034,	. ,	Toxaphene[a]	P39400,	. ,
Lead +	P01051,	0.0097 ,	2,4-D[a]	P39730,	. ,
Mercury +	P71900,	< 0.001 ,	2,4,5-TP Silvex[a]	P39045,	. ,
Nitrate (N)	P00620,	10.1 ,	TTHM[a]	P82080,	. ,
Selenium +	P01147,	. ,		,	. ,
Silver +	P01077,	< 0.02 ,	Cyanide, Total	,	< 0.01 ,
Fluoride	P00951,	. ,	Cyanide, Free	,	< 0.01 ,
	,	. ,		,	. ,
Alkalinity	P00410,	. ,		,	. ,
Calcium	P00916,	76. ,		,	. ,
Chlor[illegible]	P00940,	36. ,		,	. ,
Copper +	P01042,	. ,		,	. ,
Hardness	P00900,	. ,	Radium-226/228[b]	P11503,	. ,
Iron +	P01045,	. ,	Gross Alpha, Tot[b]	P01501,	. ,
Magnesium	P00927,	20. ,	— Count Error[b]	P01502,	. ,
Mang[illegible]se +	P01055,	. ,	Beta Activity[b]	P03501,	. ,
pH	P00403,	7.8 ,	Cesium-134[b]	P28414,	. ,
Sodium	P00929,	. ,	Iodine-131[b]	P28301,	. ,
Sulfate	P00945,	. ,	Strontium-90/89[b]	P01082,	. ,
TDS	P00500,	. ,	Tritium[b]	P82126,	. ,
Zinc +	P01092,	. ,	Uranium[b]	P22706,	. ,

Units are mg/l unless otherwise noted.

[a] Units are µg/l
[b] Units are pCi/l

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000337

Send 3 copies of completed form to:
Arizona Department of Health Services
Office of Waste and Water Quality Mgmt.
Compliance Section
Form 304

Comments:

Analysis Date 07/17/89

Analyst [illegible]

POST BANKRUPTCY
ADEQ FOLLOW-UP

GROU' 'ATER QUALITY PROTECTION
Perm No. G-0020-02

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COMPLIANCE SECTION

STATE OF ARIZONA

GROUNDWATER QUALITY PROTECTION PERMIT

PART I. AUTHORIZATION FOR FACILITY OPERATION SUCH THAT GROUNDWATER QUALITY OF THE STATE OF ARIZONA IS NOT ADVERSELY IMPACTED.

In compliance with the provisions of A.R.S. 36-1851 et seq; A.A.C. Title 9, Chapter 20, Article 2; A.A.C. Title 9, Chapter 21, Article 4; and conditions set forth in this permit:

Facility Name:

Grand Central Leaching

Land Owner:

Tombstone Development Co.

Lessee/Operator:

PBR Minerals, Inc.
950 Skyline Drive
P. O. Box 370
Tombstone, Arizona 85638

is authorized to operate the Grand Central Leaching facility located approximately one (1) mile south of Tombstone, Arizona, in Cochise County over groundwater of the Upper San Pedro Basin in Township 20 South; Range 22 East; Section 11, 12, 13, 14 - Gila and Salt River Base Line and Meridian.

Effective Date 01/20/89

This permit shall become effective on the date of the Director's signature and shall be valid for the operational life of the facility provided that the facility is operated and maintained in compliance with the specific conditions, general conditions, information documented or referenced in PART I, II, III and IV of this Permit, and the Groundwater Quality Standards and Aquifer Water Quality Standards are not violated (PART V).

J. Michael Ashworth
President
PBR Minerals, Inc.

Signed this 20th day of January 1989

Ronald L. Miller, Ph.D.
Assistant Director
Arizona Department of Environmental Quality

Signed this 20th day of January 1989

PART II. SPECIFIC CONDITIONS (R9-20-208.C.)

A. Containment/Disposal Requirements

II.A. 1. Containment

The permittee is authorized to operate a hydrometallurgical precious metal recovery facility utilizing the cyanide heap leach process. Components of the facility's operation shall include an impervious lined leach pad, impervious lined leach solution containment ponds, a final recovery circuit, a lined neutralized tailings disposal area, an impervious lined cyanide mixing and container rinsing area and a storm water diversion system. The facility shall be constructed and maintained in such a manner as to prevent discharge of pollutants to the land surface or subsurface which may have an adverse impact on groundwater.

II.A.1. a. Heap Leach Process

Material (ore) to be processed at the facility shall be from on-site mining activities. It is anicipated that the mining will produce 350,000 tons of ore per year which will be processed by the heap leaching method. Crushed ore shall be loaded on an impervious lined pad and leached with a dilute solution of sodium cyanide with an expected 600 gpm circulation rate. "Pregnant" leach solution is treated for recovery of precious metals then returned to the leaching circuit. There shall be no surface or subsurface disposal of leach solution. All leach solution shall be contained in impervious devices and recycled within the process.

II.A.1. b. Leach Pad Design with Leak Detection/Collection

The leach pad shall cover an area of approximately 200,000 square feet (4.5 acres). The leach pad will be divided into four (4) equally sized segments by the installation of two (2)-foot high berms which run north to south across the leach pad. The segment berms will be installed to assist in drainage and removal of leach solution by placing a six (6)-inch perforated HDPE pipe running along the toe of the berms. The entire pad will be graded from southeast to the northwest.

High Density Poly-Ethylene Pipe?

The leach pad shall be lined with a flexible synthetic membrane which will be placed over a compacted clay subliner. The compacted clay subliner shall have a minimum thickness of two (2)-feet and shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D698 Method. The frequency of the field density test shall be not less than one (1) test for each 500 cubic yards of placed subliner material. There shall be at least one (1) field density test for

(continued) II. A. 1. b

each lift of subliner material placed and compacted. Written records shall be maintained for each construction day, covering the subject construction activities. The written records and reports shall be in accordance with the respective Quality Control (QC) Procedures Plan as submitted and documented in the Notice of Disposal file and shall include results of all tests conducted. The original records of all daily construction testing shall be kept on-site and available for Departmental review.

Leak Detection Location →

The leach pad leak detection/collection system shall consist of four (4) perforated two (2)-inch HDPE pipes bedded in sand and gravel filled trenches running beneath the toe of the segment berms on the south side of the berms. The HDPE collection and conveyance pipes shall be plumbed to the leak detection manholes located on the north edge of the leach pad. All sand and gravel utilized in the leak detection system shall be approved by the liner contractor.

The 40-mil flexible membrane (FM) leach pad liner shall meet or exceed the National Sanitation Foundation minimum material properties (NSF Standard 54). Prior to installation of the FM liner, the lining contractor shall inspect and verify the subgrade to be a continuous smooth surface free of rock protrusions, nested gravels or other abrupt irregularities and that proper compaction has been achieved. Field seaming shall require a minimum overlap of six (6) inches for adjoining FM sheets and shall be seamed using industry standards. All field seams shall be tested by the Air Lance Method. Destructive shear and peel test (ASTM D4545 6.1.2. and 6.1.1.) shall be performed by an independent testing laboratory on field seaming every 500 lineal feet of seaming. The authorized installation contractor or the field service representative shall provide written certification that states installation of the liner system was performed in accordance with the manufacturer's recommendations and industry standards. Liner installation shall be supervised by a lining contractor or field service representative which has more than five (5)-million square feet of successfully installed flexible membrane lining.

II A. 1. c. Solution Storage Ponds with Leak Detection/Collection

How?
a. Buried
b. Painted with white paint.
c. etc.

The PVC pipe which shall be used to transport the leach solution from the leach pad to the pregnant pond shall be located in a flexible membrane lined trench capable of containing and draining leach solution to the pregnant pond in the event of pipe failure. The PVC pipe shall be protected from the sunlight. The PVC pipe which shall be used to transport the neutralizing solution from the leach pad to the neutralization pond shall require the

(Continued) I.A.1.C. same protection as required for leach solution piping. All pipes transporting leach solution from lined containment areas shall require the same protection as stated above.

The solution ponds, pregnant, barren and neutralization shall each consist of double liners of a flexible membrane material which is sunlight resistant. The solution ponds shall have a total capacity of 1.3 million gallons with maintaining one (1) foot of freeboard. The solution ponds shall have a liner system consisting of four (4) layers; first, a primary flexible membrane liner with a minimum thickness of 30-mil; underneath the primary liner shall be a geotextile drainage net for the leak detection system. The underliner shall be a flexible membrane liner with a minimum thickness of 30-mil. Underneath the flexible membrane underliner shall be a two (2)-foot thick clay subgrade which shall serve as further protection against solution leakage.

The bottom of both ponds shall be sloped to a gravel-filled leak detection/collection sump which shall be placed in between the primary flexible membrane liner and the flexible membrane underliner. A 12-inch HDPE pipe shall be plumbed to the leak detection/collection sump and shall extend to above the crest elevation of each pond to provide access for the detection and sampling of any fluid in the sump. Geomembrane liner installation and field seaming tests as described for the heap pad liner installation shall be required for pond liner installations.

Leak Detection Location →

II.A.1.d. Product Recovery and Spill Containment

Precious metals contained in the leach solution shall be recovered in the extraction plant. Leach solution in the pregnant solution pond shall be pumped to the extraction plant and then into the barren solution storage pond. The extraction plant area shall be sloped to drain to the barren solution storage pond. The concrete floor of the extraction plant shall be designed to drain to a cement sump piped to conduct flow to the barren solution pond. The cement floor structure and sump drainage shall be capable of draining all solutions being processed within the extraction plant.

II.A.1.e. Neutralized Tailings Disposal

The waste product (leached tailings) generated by the heap leach processing shall be rinsed and neutralized in place on the heap leach pad. Tailings shall not be removed from the heap leach pad until neutralized to contain less than 0.45 mg/Kg cyanide as per the weak-acid dissociable (ASTM Method C) analytical test method.

0.45 mg/Kg = 0.45 ppm

(continued) II. A. 1. e. Transferring of neutralized tailings from the heap leach pad to the spent ore disposal area shall be exercised with care to avoid spillage and shall be supervised by PBR, Inc. management. The neutralized tailings shall not be removed from the clay-lined spent ore disposal area and shall be stacked to prevent slumping and shall not allow discharge of any material or fluids to the land surface or subsurface.

The spent ore disposal area shall be lined with a compacted clay liner with a minimum thickness of two (2)-feet and shall be compacted to a minimum of 95 pecent of maximum density as determined by ASTM D698 Method. The frequency of the field density test shall not be less than one test for each 500 cubic yards of placed liner material. Written records shall be maintained for the liner construction activities. The written records and reports shall be in accordance with the respective Quality Control (QC) Procedures Plan as submitted and documented in the Notice of Disposal file. The original records of all construction testing shall be kept on-site and available for Departmental review.

II. A. 1. f. Storm Water Protection

The entire facility site shall be protected from storm water runoff associated from a 100-year/24-hour storm water event (3.75 inches) by a series of surface water diversion devices constructed to prevent any runoff from entering the processing site or spent ore disposal area. All lined areas shall be capable of containing a 100-year/24-hour storm water event which will land on the lined areas. The pregnant and barren solution ponds shall have a normal operating capacity while maintaining a one (1)-foot freeboad. Only during precipitation events can the one (1)-foot freeboad be exceeded and at such time the storm water back-up pond shall be used to store excess solution. The storm water back-up pond shall require an impervious liner of a flexible membrane material with a minimum thickness of 30-mil with a two (2)-foot clay subgrade. Liner installation procedures, testing and record keeping shall be the same as required for the construction of the heap leach pad. The storm water back-up pond shall not be used during normal operations; it shall only be used during or after precipitation events which cause solution levels in the solution ponds to exceed the one (1)-foot freeboad operating level. Solution collected in the storm water back-up pond shall be introduced back into the leaching circuit. In the event solution in the storm water back-up pond cannot be reintroduced back into the leaching circuit within ten (10) days, it shall be neutralized to contain less than 0.20 free cyanide and transferred to the neutralization pond. A written log shall be kept

Storm water Plan

What are units? Is this "permit" "conform/type" to ADEQ?

Storm Water Run-off Log →

daily available for Departmental review of solution entering and leaving the storm water back-up pond.

II.A.1.g. Chemical Storage

Sodium cyanide used in the leaching process shall be stored in "air-tight" drums in the cyanide storage area which shall have a concrete slab with six (6)-inch curbing and shall have a drainage system with an outlet to the barren solution pond and a canopy to protect the drums from sunlight and weather. A fresh water rinse pad shall be installed for washdown of the chemical containers and shall consist of a concrete slab with a six (6)-inch curbing which has a drainage system with an outlet to the barren solution pond. Empty chemical containers which have been triple rinsed shall be stored on-site until either returned to vendor or an approved landfill or recycling center. A sufficient stock of hypochlorite shall be maintained on-site for the purpose of neutralizing any cyanide in the event a spill occurs outside the areas of lined containment.

II.A.1. h. Domestic Sewage Disposal

Only nonresidential structures shall be built on-site to serve as an analytical laboratory, offices and storage. Domestic sewage disposal shall be by means of Cochise County approved septic tank systems. All analytical samples shall be returned to the leaching circuit so that no discard of analytical samples are to the land surface or subsurface.

(Cyanide tests on las[illegible]

II A. 2. Unauthorized Materials

II.A.2.a. Materials authorized to be disposed of in all septic tanks shall be typical household sewage and shall not include laboratory materials, motor oil, gasoline, paints, varnishes, solvents, pesticides, fertilizers or other materials not generally associated with toilet flushing, food preparation, laundry facilities and personal hygiene.

II.A.2.b. No commercial operations utilizing hazardous materials or creating hazardous wastes shall dispose of such materials into these systems.

II. A. 3. Operational Practices

TEI well #2 pumped continuously

a. TEI Well #2 shall be pumped as continuously as is practicable. Any mechanical down-time shall be minimized by expeditious repairs. This well shall be utilized as the main source for the facility's water supply to encourage continual pumping.

II.A.3. b. Adequate supervision and operation shall be performed to ensure that all employees of the facility are aware of and understand the containment/disposal requirements of PART II.A.

II.A.3.c. All employees shall be required to attend a cyanide safety and first-aid seminar offered on-site by the chemical supplier or the Arizona State Mine Inspector.

II.A. 4. Discharge Source Limits

II.A.4. a. There shall be no discharge of pollutants that violate the State of Arizona Groundwater Quality Standards (A.R.S. ~~R9-21-401~~, et seq.).
(now R18-11-401; et. seq.)

II.A.4. b. Analyical sampling aliquots shall be returned to the heap leach solution circuit and shall not be disposed of on the land surface or subsurface.

II.A.5. Leak Detection Limits

Check Weekly ⇒ Any fluid collected at the leak detection/collection sampling points shall not exceed a pH of 8.5 or show the presence of free cyanide in excess of 0.20 mg/l.

II.A.6. Modification

90-Day Modification Notice

This permit is issued contingent upon the above conditions. The permittee shall give 90-days advance, written notice to the Department of any modification to the above facility.

II.A.7. Other Laws and Rules

The issuance of this permit does not waive any federal, state, county or local government rules, regulations or permits for which this facility may have to comply.

II. B. Monitoring Requirements, Record Keeping (R9-20-215)

II.B 1. Monitoring Type and Conditions

a. Leach Solution Monitoring

* Daily Records → The leaching solution used in the hydrometallurgical heap leach process shall be closely monitored at least daily in the form of a water balance record. The daily water balance record shall include: The amount of fresh water added to the leaching circuit, the amount of chemicals (cyanide, lime, NaOH) added to the leaching circuit, and a daily solution level in the pregnant pond, barren pond, neutralization pond and storm water back-up pond (if any). (1) (2) (3) (4) (5) (6)

000344

* = NOT IN COMPLIANCE WITH PERMIT (as of 3/5/90)

II.B.1.b. Leak Detection and Collection Monitoring

The leak collection sampling points specified in PART II.A.1.b. and c. shall be monitored weekly for the presence of fluid. Any fluid collected shall be analyzed by standard field methods for pH and free cyanide. Refer to contingency requirements (PART II.C.) for action to be taken if free cyanide is detected in excess of 0.20 mg/l.

II.B.1.c. Neutralized Tailing Disposal Monitoring

Prior to transferring neutralized spent ore from the heap leach pad to the spent ore disposal pad, the spent ore shall be sampled and assayed to assure that the material contains less than 0.45 mg/Kg of weak-acid dissociable (ASTM D4374 Method C) cyanide. Sampling shall be conducted at three (3) randomly-selected sites across the pad segment surface which has received the neutralization procedure. Samples shall be recovered by means of a bucket hand auger or a backhoe. All equipment used in recovery samples shall be cleaned before sampling and between digging each sample hole. After sampling the entire depth of the tailings, the samples will be mixed and quartered. One quarter sample from each hole will be subsequently composited with the samples from the other two (2) holes. The composite sample will then be analyzed for soluble weak-acid dissociable (WAD) cyanide in accord with ASTM D4374 Method C. The remaining three quarters of each sample will be retained pending receipt of sample results.

Bucket hand auger

In the event the composite sample contains less than 0.45 mg/Kg WAD cyanide, the remaining samples can be disposed and the spent ore can be removed from the leach pad and placed on the spent ore disposal pad. If the level in the composite sample is greater than 0.45 mg/Kg WAD cyanide, all three (3) individual samples shall be assayed for WAD cyanide. Neutralization efforts shall be continued on the portion of the pad represented by the elevated level(s). Additional composite samples and neutralization efforts shall continue until the level in the pad segment to be unloaded contains less than 0.45 mg/kg WAD cyanide.

Written records of all neutralized spent ore sampling locations and analytical results shall be kept by the permittee and shall be tabularized and submitted to the Department on a quarterly basis.

Quarterly Reports To ADEG

II.B.1.d. Groundwater Monitoring

Groundwater quality conditions shall be monitored by one (1) down-gradient on-site pumped monitor well and two (2) (up-gradient and down-gradient) on-site passive

(continued) II. B. 1. d

groundwater monitoring wells. The permittee shall complete at least three (3) rounds of ambient groundwater monitoring. Enforceable Maximum Groundwater Limits (MGL) and Alert Levels shall be based on ambient groundwater quality. MGLs are equal to MCLs except in cases where ambient groundwater quality exceeds a MCL. In such a case the highest ambient groundwater quality observed for the constituent during ambient groundwater quality monitoring shall become the MGL.

Alert Levels for each groundwater monitoring constituent shall be based on the arithmetic mean for the constituent from the first three (3) rounds of ambient groundwater sampling. In calculating the mean, values reported to be below detection limit shall be regarded as one-half the detection limit. Alert Levels shall be set at the mean plus two (2) standard deviations. If Alert Levels calculated in this manner are below detection limit (analysis detection level), the Alert Level shall be set at the detection limit. If Alert Levels calculated in this manner exceed the MGL's, the Alert Level shall be set at the MGL.

Verification of an exceeded MGL or verification of an exceeded Alert Level shall require the initiation of a contingency plan.

II. B. 1 e. Groundwater Monitoring Limits and Schedule

The following wells shall be sampled and analyzed in accordance with the constituents and frequencies listed below:

Department of Water Resources

Well ID	DWR Registration	DWR Location
#1 Pumping Well	55-523032-C	D(20-22)14aaa
#2 Down Gradient Passive	xxxxxxxx-C	x,xxx,xxx,xxx,xxx
#3 Up Gradient Passive	xxxxxxxx-C	x,xxx,xxx,xxx,xxx

Constituent	Frequency	Alert Level	MGL
Cyanide (total)	Quarterly	Detection Level	0.20 mg/l
Mercury	Quarterly	Detection Level	0.002 mg/l
Arsenic	Quarterly	Detection Level	0.05 mg/l
Lead	Quarterly	Detection Level	0.05 mg/l
Silver	Quarterly	Detection Level	0.05 mg/l
Nitrate (as N)	Quarterly	Reserved	10.0 mg/l
pH	Monthly	Reserved	N/A
Calcium	Monthly	Reserved	N/A
Chloride	Monthly	Reserved	N/A
Magnesium	Monthly	Reserved	N/A

(continued) II. B. 1. e

(Continued)

Constituent	Frequency	Alert Level	MGL
Potassium	Monthly	Reserved	N/A
Sodium	Monthly	Reserved	N/A
Sulfate	Monthly	Reserved	N/A
Total Dissolved Solids	Monthly	Reserved	N/A
Zinc	Monthly	Reserved	N/A

The following parameters shall be recorded immediately before each groundwater monitoring sample round:

Well ID#, Date, Time, Name of Technician
Volume of water extracted
Temperature of groundwater
pH
Specific Conductance

II. B. 1. f. Groundwater Monitoring Protocol

Static water level shall be measured in each of the three (3) monitor wells prior to pumping and purging for a sample round. Immediately before a sampling round each well shall be purged. Purging shall consist of removing at least three (3) casing volumes of water (as measured using the static water level) or until indicator parameters are stable (Conductivity, pH and Temperature), whichever represents the greater volume. If the well recharges slowly or is pumped dry, the well shall be allowed to recover to 80% of the static water level before sampling.

The ADEQ Quality Assurance Operation Plan procedures must be followed while sampling and transporting the samples to the designated lab. Travel blanks, equipment blanks and duplicates must be obtained as stated in the Department's QA/QC document. Chain of custody protocol must be followed. Analysis for all groundwater sampling shall be performed only by laboratories certified by the State of Arizona, using USEPA approved methods. To ensure proper preservation of the samples, the receiving laboratory shall be contacted prior to sampling to ensure that all required preservatives have been added to the sample containers and to ensure that all samples shall be delivered within the maximum allowable holding times. For results to be considered accurate and valid, all analytical work shall meet all quality control standards specified by the Arizona Department of Health Services, Office of Laboratory Licensure Certification (phone number in PART III of permit). Groundwater sample results shall be submitted on the forms supplied by the Department or on a form approved by the Department prior to submittal.

Which Sept. ?
A2115
A554

II.B. 2. Reporting Requirements

Required: Interpretive Assessment Reports

The permittee/operator shall prepare a quarterly interpretative assessment report for the entire facility and shall include all records of all construction testing and all monitoring as required by this permit. The quarterly report submitted to the Department shall include:

II.B.2. a. Construction Testing Results

(1) Compaction/Density Testing Results OK

(2) Flexible Membrane Field Seaming Testing Results NO

(3) Construction Status of Facility Operations OK

II.B.2. b. Leach Solution Monitoring

(1) Daily amounts of fresh water and chemicals added to the leaching circuit. OK

(2) Daily solution levels in the pregnant pond, barren pond, neutralization pond and storm water back-up pond (if any). OK

II.B.2 c. Leak Detection Monitoring

(1) Weekly testing for the presence of fluid and if fluid is present, testing for pH and free cyanide in the four (4) leak detection manholes located in the heap leach pad. ?

(2) Weekly testing for the presence of fluid and if fluid is present, testing for pH and free cyanide in the leak detection sump located in the pregnant and barren solution ponds. ?

II.B.2.d. Tailings Neutralization Monitoring

Random sample locations

(1) Neutralized tailings sample locations and analytical results.

Amount -- what are units? Cubic feet/yds 2. Pounds of tailings

(2) The amount of neutralized tailings removed from the leach pad and placed on the spent ore disposal area.

II.B.2. e. Groundwater Monitoring

(1) Quarterly analytical results for constituents with MGLs.

(2) Monthly analytical results for constituents without MGLs.

II. B.2. f. Corrective Actions

(1) If exceeding any permit limit during operational monitoring, describe the actions taken.

(2) Type and volume of any spill not contained within the leaching circuit and actions taken.

II. B. 2. g. Reporting Frequency

Quarterly reports shall be submitted to the Department in accordance with the following schedule:

Should have 4 in file as of today (3/05/90)

Interpretative Assessment Report for:	Due Date
Oct, Nov, Dec	Feb 1
Jan, Feb, Mar	May 1 - 1
Apr, May, Jun	Aug 1 - 2
Jul, Aug, Sep	Nov 1

If, for any reason, the permittee is unable to comply with the schedule for report submittal, the permittee shall provide the Director in writing with the following information within five (5) days of becoming aware of such a condition or five (5) days prior to due date:

(1) A description of the cause for non-compliance with the due date; and,

(2) The period, including exact dates of the period of non-compliance and steps that are being taken to correct the condition.

The interpretative assessment report including all monitoring forms and analytical results shall be submitted in duplicate to the following location:

Arizona Department of Environmental Quality
Office of Water Quality
Water Pollution Control Compliance Unit
2005 N. Central Avenue
Phoenix, Arizona 85004

II. C. Contingency Requirements (R9-20-206.D.2.)

II. C. 1. Should any fluid be collected in any of the leak detection sampling points which exceed the permit limits (Part II.A.4.) or should any groundwater sample exceed the permit limits (MGLs or Alert Levels, PART II.B.1.e.), the permittee shall contact the Department's Water Pollution Control Compliance Unit (PART III) within 72 hours of being aware exceeding a permit limit. When any permit limit has been exceeded and the

Permit # ~~12~~ G-0020-02
PBR Minerals, July 1989
L 627-5321
TEI - Tombstone Exploration Inc

Well #2 - ~2"
- 510' down

B.2.C.1 & 2 not in weekly

B.2.~~d~~.1 & 2 OK in spiral notebook

B.~~2~~.d. - Well installation dates
Roger K. → year? given

One new well is drilled (the Northwest.
no data back from Smith &
Smith.

Az Testing Labs

Titan Drilling? -

(continued) II. C. 1.

Department has been notified as required above, the permittee shall within 48 hours initiate a re-sampling program to verify that a permit limit has been exceeded. Upon verification, a ~~scope of work~~ which addresses corrective and remedial actions shall be submitted to the Department for review and comment within 30 days of a verified sample exceeding a permit limit. Upon approval by the Department, the contingency plan shall be incorporated into the permit.

II. C. 2. In the event of a leach solution spill onto the land surface, it shall be neutralized immediately with a five (5) percent hypochlorite solution with a pH of greater than 10.0. A sufficient amount of hypochlorite shall be stored on-site to accommodate such or any other type of unforeseen situation. Any leach solution or chemical spill shall be reported to the Department's Water Pollution Compliance Unit and the Cochise County Health Department within 72 hours of the spill and any spill or clean-up activities (corrective actions) shall be documented in the quarterly submittal of the interpretative assessment report.

II. D. Post-Closure Plan (R9-20-206.D.3. and R9-20-216.C.2.)

Closure Notice

II. D. 1. The permittee shall notify the Department at least 180 days prior to abandonment of the facility. The permittee shall be required to submit a detailed post-closure plan to the Department for approval and shall be incorporated into this permit.

II. D. 2. Before permanent abandonment of the facility site, the permittee shall adhere to the following procedures for closure when utilizing cyanide.

II. D. 2. a. Operate the leach solution circuit for a minimum of 96 hours without the addition of cyanide, adding only fresh water and caustic soda to maintain water levels and a pH of 10 to 11. Test the leach solution for any residual free cyanide. If free cyanide is detected in concentrations of greater than 0.2 mg/l, continue with next steps ("b." and "c." hypochlorite neutralization). If free cyanide is not detected in concentrations of greater than 0.2 mg/l, go to step "e.".

II. D. 2. b. Run a 1% hypochlorite solution through the pregnant pond and barren pond for a minimum of 24 hours.

II. D. 2. c. Run a 1% hypochlorite solution through the entire heap leaching system for a minimum of 48 hours.

II. D. 2. d. Test the rinseate for free cyanide as described in PART II.B.1.a. If free cyanide is detected in concentrations of greater than 0.2 mg/l, repeat steps "a." "b." and "c." above and test for cyanide again.

II.B.2.e. Allow solutions to evaporate from the ponds. Any remaining residues or sludges shall be analyzed by EPA approved test methods (Test Methods for Evaluating Solid Waste, SW-846, 2nd Edition) for the following constituents, and the results reported to the Department:

Constituent	Limits
Cyanide (Total and Free)	10 mg/l
Arsenic	5 mg/l
Barium	100 mg/l
Cadmium	1 mg/l
Chromium	5 mg/l
Lead	5 mg/l
Selenium	1 mg/l
Silver	5 mg/l

If any constituent exceeds its associated limit, the residual sludge shall be removed and disposed of at a landfill approved for handling hazardous waste.

Error should be #3

II.D.2. The permittee shall file a report with the Department's Water Permits Unit following closure describing the results of each step of the closure plan within 60 days after closure.

II.E. Compliance Schedule (R9-20-219)

Required Closure Report for Remediation of TEI Well #2.

The permittee shall complete a site assessment and develop a closure report for the remediation of TEI Well #2 addressing whether groundwater quality standards will be maintained at the downgradient property boundary. Monthly monitoring of TEI #1, #2 and #3 groundwater wells shall be for the following constituents: NO_3-N, CN (total and free) and Hg until the Director deems necessary based on review and approval of the site assessment and closure report.

The tasks of the site assessment and submittal of the closure report shall be performed in accordance with the following schedule of compliance:

The permittee shall submit reports of compliance or noncompliance with the interim requirements of the compliance schedule within 14 days following each interim date.

Not Due: Jan. 20 - April 20, 1989

II.E.1. Prior to Leaching Operations

Which well #?

Install the downgradient pumping monitor well and collect three (3) rounds of ambient groundwater samples for analysis of constituents listed in PART II.B.1.e. so that MGL's and Alert Levels can be established prior to initiation of the facility's leaching operation. #

Due: May 4, 1989
(Not Done Totally)

II.E.2. Three (3) Months from Permit Issuance

Complete aquifer testing (pump test) of TEI Well #2. Submit historical pumping records for TEI Well #2.

Due: August 3, 1989

II.E.3. Six (6) Months from Permit Issuance

Submit to the Department an interpretative aquifer characteristics report including:

(Partial Submittal)

a. Water Table map showing groundwater flow directions with groundwater contour elevations;

b. aquifer testing results for TEI Well #2;

c. water quality data for all on-site groundwater wells since the issuance of this permit; and

d. proposed locations for additional groundwater monitoring wells (minimum of two (2)).

Due: Nov. 3, 1989
(Not Done)

II.E.4. Nine (9) Months from Permit Issuance

The installations of additional monitor wells shall be completed. Submit to the Department the driller's logs for each of the wells completed and groundwater quality data for each of these wells.

Due: Feb. 3, 1990
~~(actually, Feb. 5, 1990)~~
(Not done)

II.E.5. Twelve (12) Months from Permit Issuance

Submit a closure report addressing all remedial activities and any further actions needed to establish compliance with this permit.

PART III. REFERENCES: PERTINENT INFORMATION

III. A. References

The terms and conditions set forth in this permit have been developed based upon the information contained in the following:

1. Groundwater Field Inspection Form(s) dated _____

2. Notice of Disposal dated 7-22-88

3. Groundwater Impact Review (re above No. 2) dated _____

4. Plan Review File Number N/A

5. Permit Application dated 8-3-88

6. Groundwater Impact Review (re above No. 5) dated _____

7. Amendments to above Nos. 2, 4 and 5 dated _____

8. Public Notice dated 11-14-88

9. Public Hearing comments, correspondence and any additional supplemental information contained in the facility permit file.

10. Other ADEQ Water Pollution Control Compliance Unit
Phone No. (602) 257-6818
ADHS Office of Laboratory Licensure Certification
Phone No. (602) 255-1188

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10. Other ADEQ Water Pollution Control Compliance Unit
Phone No. (602) 257-6818
ADHS Office of Laboratory Licensure Certification
Phone No. (602) 255-1188

III. B. Facility Information

1. Facility Contact Person Gary A. Lindroos

2. Address 950 Skyline Drive
P. O. Box 370
Tombstone, Arizona 85638

3. Emergency Telephone Number: Business (602) 457-2282
Home ( )

The Department shall be notified within 30 days of a change in the facility contact person.

4. Landowner of Facility Site Tombstone Development Co.

III. C. Definitions

1. "Abandoned" means permanent cessation of facility operation, as determined by the facility owner. Facilities which are temporarily shut down are not considered abandoned within the context of these regulations.

2. "Activity" means any human activity including institutional, commercial, manufacturing, extraction, agricultural or residential land use which may involve disposal of wastes or pollutants which may result in pollution of groundwaters of the State.

3. "Adverse impact upon groundwater quality" has the meaning ascribed to it in A.A.C. Title 9, Chapter 20, Article 2, Section R9-20-203.3, R9-20-206.A.7, R9-20-208.A, R9-20-216.B.4 and R9-20-220.A.

4. "Approved" or "approval" means approved in writing by the Director.

5. "Aquifer" means a geologic unit that contains saturated permeable material to yield usable (drinking water, agriculture, industry, etc.) quantities of water to a well or spring.

6. "Aquifer Water Quality Standards" means the standards as defined by A.R.S. 49.223.

7. "Areal composite sample" means a set of samples collected from an area and combined into a single sample. The number and spacing shall be representative of the quality of the accumulated material.

8. "Compliance Schedule" or "Schedule of Compliance" means a written document issued by the Director which identifies requirements and times for compliance with either or both the water quality standards in A.A.C. Title 9, Chapter 21 or the permit regulations in A.A.C. Title 9, Chapter 20.

9. "Composite sample" means a combination of four (4) individual portions obtained at equal time intervals for one (1) hour. The volume of each individual portion shall be directly proportional to the discharge flow rate at the time of sampling. The sampling period shall coincide with the period of maximum discharge flow.

10. "Department" means the Arizona Department of Environmental Quality (ADEQ).

11. "Director" means the Director of the Arizona Department of Environmental Quality or his duly authorized representative.

III. C. 12. "Discharge" means the addition, spilling, leaking, pumping, pouring, emitting or dumping of any pollutant into waters of the State from any point source.

13. "Discharge Impact Area" means the potential area extent of waste or pollutant migration as projected on the land surface as a result of a discharge or disposal from a facility.

14. "Discrete sample" means any individual sample collected in less than 15 minutes.

15. "Disposal" means the discharge, deposit, well injection, dumping, spilling, leaking, or placing of any wastes or pollutants into or on any land or water such that groundwater is or may be affected. For the purposes of this Article, irrigation with effluent from a wastewater treatment facility is disposal if the application rate exceeds that amount necessary to satisfy the consumptive use and leaching requirements of the crop or landscaping being irrigated.

16. "Disposal system" means a system for disposing of wastes either by surface or underground methods and includes sewerage systems, treatment works, disposal wells and other systems.

17. "Facility" means any system or activity in which or by which disposal occurs or has occurred on either a continuous or intermittent basis.

18. "Flow rate" means the volume per unit time given to the flow of fluids.

19. "Geologic unit" means a geologic formation, group formations or part of a formation.

20. "Groundwater" means water under the surface of the earth regardless of the geologic structure in which it is standing or moving. Groundwater does not include water flowing in underground streams with ascertainable beds and banks.

21. "Groundwater Quality Standards" means the standards in A.A.C. R9-21-403.

22. "Hazardous waste" means a waste as defined by the Federal Resource Conservation and Recovery Act (P.L. 94-580).

23. "Hydraulic conductivity" means a measure of the capability of a geologic unit to transmit a fluid.

III. C. 24. "Individual disposal system" means a device or system for the treatment or disposal of sewage from a single housing unit or equivalent.

III. C. 25. "Maximum Disposal Limit (MDL)" means the maximum permissible concentration for a contaminant in an effluent stream.

26. "Maximum Groundwater Limit (MGL)" means the maximum permissible concentration for a contaminant in water.

27. "Modification" means a change in the location, volume, constituent(s) or constituent concentration(s) of a disposal, which is described in the permit issued pursuant to R9-20-208.

28. "Operator" means any person who makes management decisions regarding facility operations.

29. "Owner" means any person holding legal or equitable title in any real property subject to these regulations.

30. "Permit" means a rule, certificate, letter or any other document issued by the Director authorizing and conditioning the discharge of any pollutant to groundwater from any point source or disposal of wastes from any disposal system identified in A.R.S. Sec. 36-136.G.8.

31. "Pollute" means to cause pollution.

32. "Regulations" means A.A.C. Title 9, Chapter 20, Article 2, requirements for facilities affecting groundwater quality.

33. "Sewage" means wastes from toilets, baths, sinks, lavatories, laundries and other plumbing fixtures in residences, and wastes from institutions, commercial buildings, mobile homes and other places of human habitation, employment or recreation which are similar in content to residential wastes.

34. "Site" means the area where any facility is physically located or an activity is conducted, including adjacent land used in connection with the facility.

35. "Treatment works" means any plant or other works used for the purpose of treating, stabilizing or holding wastes.

III. C. 36. "Vadose zone" means the zone between the land surface and the principal zone of saturation.

PART IV. GENERAL CONDITIONS: RESPONSIBILITIES

IV. A. Permit Duration (R9-20-210)

1. Permits shall be valid for the expected operational life of the facility under the ownership as set forth in the permit unless otherwise limited by Federal or State statute or transferred pursuant to R9-20-221.C.

2. A permit may be modified or terminated pursuant to R9-20-221.

3. The owner or operator of the facility may request that a permit be issued for a duration that is less than the full allowable term.

IV. B. Permit Rights (R9-20-214)

1. A permit does not convey any property or water right of any sort or any exclusive privilege.

2. A permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of federal, state or local laws or regulations.

IV. C. Monitoring Requirements; Record Keeping (R9-20-215)

IV.C. 1. The permittee shall implement and maintain an approved monitoring system if required as a condition of a permit.

a. The permittee shall install, use and maintain all monitoring equipment in acceptable condition or provide alternate methods approved by the Department.

b. The permittee is required to conduct monitoring of a type and frequency sufficient to yield data which are representative of the monitored activity.

IV.C. 2. The permittee shall retain records or have access to all monitoring information for a period of at least three (3) years from the date of the sample or measurement. This period may be extended by written request of the Department at any time. Copies of records shall be furnished to the Department upon written request.

ADEQ may extend "automatically" record maintenance at any time via writing.

a. Records of monitoring information shall include but are not limited to the following:

(1) The date, time, exact place and name of individual(s) who performed the sampling or measuring;

(2) the date(s) of, and name(s) of the individual(s) who performed the analyses; and

IV.C.2.a.(3) the analytical techniques or methods used to perform the analyses.

IV.C.2.b. Monitoring results shall be reported at intervals specified in the permit.

IV.C.2.c. Calculations which require the averaging of measurements shall utilize an arithmetic mean unless it can be demonstrated by the permittee that another method would more accurately describe or be representative of the monitored activity.

IV.C.3. Information submitted as a result of any well boring shall include a complete driller's log and drawings showing details of the well's construction. If information must be submitted more than once for the same well, then subsequent submittals shall note that the driller's log and construction drawings have already been submitted and the date of the initial submittal shall be documented.

IV. D. Reporting Requirements (R9-20-216)

IV.D.1. The permittee shall give 90-days advance, written notice to the Department of any modification to the facility which is not described in the approved Notice of Disposal or permit application.

IV.D.2. The permittee shall notify the Department within 72 hours of becoming aware of any permit violation. The Department may require the permittee to submit a written report within 30 days documenting the following:

IV.D.2.a. A description of the noncompliance and its cause;

IV.D.2.b. the period of noncompliance, including exact date(s) and time(s), and the anticipated time period during which the noncompliance is expected to continue if it has not been completely corrected;

IV.D.2.c. action taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance. If applicable, such action shall be in accordance with an approved contingency plan;

IV.D.2.d. monitoring or other information which indicates that any waste or pollutant may cause an endangerment to an aquifer; and

IV.D.2.e. noncompliance with a permit condition or malfunction of the disposal system which may cause fluid migration into or between aquifers.

IV. D. 3. The Department shall be notified in writing at least 180 days prior to abandonment of the facility.

IV. D. 3. a. The permittee may be required to submit a detailed post-closure plan to the Department for approval which shall describe what the physical condition of the facility will be on the date operations are terminated.

IV. D. 3. b. The Department may require the post-closure plan to include any or all of the following:

(1) A description of monitoring procedures to be implemented by the permittee including monitoring frequency, type and location which will be implemented to ensure post-closure activities will not violate groundwater quality standards;

(2) a description of procedures for maintaining existing groundwater quality protection systems;

(3) a schedule and description of physical inspections to be conducted at the facility following abandonment;

(4) a description of future land or water uses or both which may be precluded as a result of facility abandonment; and

(5) identification of responsibilities for post-closure cleanup or remedial action in the event of pollution of waters of the State.

IV. E. Site Examination (R9-20-217)

IV. E. 1. The Department may routinely inspect the facility or an activity used for the generation, storage, treatment, collection or disposal of any waste or pollutant, and where records are kept for the purpose of determining compliance with these regulations or water quality standards, or verifying information submitted in a Notice of Disposal or permit application, or documented in a permit including any permit conditions.

IV. E. 2. The Department may:

a. Obtain samples of wastes or pollutants;

b. analyze or cause to be analyzed any samples either on site or at another location;

c. take photographs of waste and equipment processes and conditions at the site; or

d. inspect and copy any pertinent records, reports, information and test results.

IV. E. 3. Any pertinent information required by the permit to be maintained by the permittee shall be available for on-site inspection during normal business hours. Split samples and copies of photographs will be provided to the facility owner or operator if the owner or operator requests them at the time the sample(s) is obtained or the photograph(s) is taken as the case may be.

IV. E. 4. Inspections shall be conducted pursuant to the appropriate provisions of the Arizona Revised Statutes and policies established by the Department.

IV. F. Proper Operation and Maintenance (R9-20-218)

The permittee shall at all times maintain in good working order and operate properly all treatment works installed or used for water pollution control and abatement to achieve compliance with the terms and conditions of the permit and water quality standards. If required by Article 5 of A.A.C. Title 9, Chapter 20, the permittee shall retain the services of an operator certified by the Department at the level appropriate to the permitted facility.

Certified Operator

IV. G. Permit Conditions (R9-20-220)

IV. G. 1. Duty to Mitigate

The permittee shall take all steps to minimize and correct any adverse impact on groundwater quality as defined in A.A.C. Title 9, Chapters 20 and 21 resulting from noncompliance with the permit.

IV. G. 2. Duty to Reapply

If a permittee has not been issued a permit for the life of the facility, a renewal application in the form of an amended Notice of Disposal or permit application shall be submitted to the Department no less than 180 days prior to expiration of the existing permit.

IV. G. 3. Duty to Comply

The permittee shall comply with all terms and conditions of the permit and take such action as is necessary to ensure compliance.

IV. H. Permit Actions (R9-20-221)

IV. H. 1. This permit may be modified, transferred, renewed or revoked for cause. The filing of a request by the permittee for a permit action does not stay any existing permit condition.

IV.H.2. Permit Modification

IV.H.2.a. Request for modification of a permit may be made by the permittee, the Department, or any affected person and shall identify the specific item(s) to be considered for modification.

IV.H.2.b. Public requests for modification of a permit shall be in writing to the Department and shall contain technical facts or reasons which justify the requested changes. The Department upon receipt of the request will notify the permittee and evaluate and determine whether any request for modification shall be granted.

IV.H.2.c. The permittee may be required to submit additional information, including an updated Notice of Disposal or permit application.

IV.H.2.d. Only those items considered for modification may be changed, and all other conditions of the existing permit will remain in effect.

IV.H.2.e. The following circumstances and occurrences shall require modification of a permit:

IV.H.2.e.(1) Modification to the facility which justify application of permit conditions that are different from or absent in the existing permit;

IV.H.2.e.(2) other information that was not available when the existing permit was issued and which justifies application of different permit conditions;

IV.H.2.e.(3) changes in the regulations or standards upon which the permit was based which have been made after the permit was issued;

IV.H.2.e.(4) good cause exists for changes in a compliance schedule because of conditions over which the permittee has little or no control and a change to the permit by modification is a reasonable remedy;

IV.H.2.e.(5) reason(s) exists for revocation of the permit, and the Department determines that modification is an appropriate method for change; and

IV.H.2.e.(6) amendment to an approved abandonment plan or contingency plan or any other portion of an approved Notice of Disposal or permit application.

IV.H.2.f. The suitability of the location of the facility will not be reconsidered during the process of changing the permit

unless new information or change to regulations indicate that a violation of adopted groundwater quality standards exist and no other action is possible to mitigate the violation and comply with groundwater quality standards.

IV.H.2.g. The Department will publish a notice of intent pursuant to R9-20-223 to modify a permit before any final action is taken.

IV.H.2.h. With the concurrence of the permittee, the Department may make minor modifications to a permit for any of the following reasons:

IV.H.2.h.(1) To correct typographical errors;

IV.H.2.h.(2) to require more or less frequent monitoring or reporting by the permittee;

IV.H.2.h.(3) to change an interim compliance date in a schedule of compliance provided the new date is not more than 60 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement;

IV.H.2.h.(4) to change quantities or types of fluids discharged which are within the capacity of the facility as permitted, and in the judgment of the Department would not interfere with the operation of the facility or its ability to meet conditions prescribed in the permit, and would not change its classification if the facility is an injection well; or

IV.H.2.h.(5) to change construction requirements approved by the Department, provided that any such alteration shall comply with the requirements of these regulations.

IV.H.3. Permit Transfer

IV.H.3.a. This permit is transferrable to any person after 30-days advance, written notice to the Department. The Department may require modification of the permit to change the name of the permittee and incorporate any requirements which may be necessary to ensure compliance with State statutes and regulations.

IV.H.3.b. The permittee shall notify by registered letter a new owner or operator of a permitted facility of the existence of the permit 30 days prior to transfer of responsibility. The notice shall include a copy of the permit. A copy of the letter shall be transmitted to the Department.

IV. H. 3. c. The new owner or operator shall be responsible for compliance with the permit upon transfer of ownership or operation without regard to whether said owner or operator has in fact received the notice required by R9-20-221.C.2.

IV. H. 3. d. Permit transfer does not absolve the previous permittee of any liability existing at or before the time the permit was transferred.

IV H. 4. Permit Revocation

IV. H. 4. a. Request for revocation of a permit may be made by the permittee, Department or any affected person.

IV. H. 4. b. Public requests for permit revocation shall be in writing to the Department and shall contain technical facts or reasons which justify the requested action. The Department upon receipt of the request will notify the permittee and evaluate the request and determine whether any request for revocation should be granted.

IV. H. 4. c. Revocation of a permit is initiated when the Department issues a notice of intent to revoke a permit pursuant to R9-20-223 to the permittee and may be initiated for the following reasons:

IV. H. 4. C. (1) Noncompliance by the permittee with any permit condition;

IV. H 4. C. (2) deliberate failure by the permittee to fully disclose all relevant facts when applying for a permit;

IV. H. 4. C. (3) intentional or deliberate misrepresentation of any relevant fact at any time by the permittee; or

IV. H. 4. C. (4) if it is determined by ADEQ that the permitted activity is causing a violation of groundwater quality standards and such violation can only be regulated to acceptable levels by revoking the permit.

IV. H. 4. d. If disposal to an aquifer causes a clear, present and immediate danger to the health or welfare of persons, the Department may immediately suspend a permit. Within 14 days of the suspension, the Department shall issue a notice of intent to revoke the permit. The permit shall be considered revoked 30 days after the notice of intent is issued by the Department unless and until a hearing is requested by the permittee pursuant to R9-20-222.

IV. I. Confidentiality of Information (R9-20-224)

IV. I. 1. Any information submitted to or obtained by the Department pursuant to these regulations may be claimed as confidential by the facility owner or operator. Any such claim shall be asserted at the time the information is submitted or obtained. If no claim is made at that time, the Department may make the information available to the public without further notice.

IV. I. 2. Claims of confidentiality for the following information shall be denied:

IV. I. 2. a. The name and address of any permit applicant or permittee; or

IV. I. 2. b. information which deals with the present or future existence, absence or level of waste(s) or pollutant(s) in water.

IV. I. 3. Criteria for determining confidentiality are:

IV. I. 3. a. A confidentiality claim has been made at the time the information was submitted or obtained;

IV. I. 3. b. the facility owner or operator has shown that reasonable measures have been taken to protect the confidentiality of the information and intends to continue to take such measures;

IV. I. 3. c. the information is not, and has not been, reasonably obtainable without the facility owner or operator's consent;

IV. I. 3. d. no statute specifically requires disclosure of the information; and

IV. I. 3. e. the facility owner or operator has shown that disclosure of the information is likely to cause harm to its competitive position; or, the information is voluntarily submitted and disclosure would be likely to impair the State's ability to obtain necessary information in the future.

IV. J. Enforcement and Penalties (R9-20-225)

Any person who constructs, operates or maintains a facility, disposal system, or introduces wastes or pollutants to waters of the State contrary to the provisions of this permit, falsifies data or information submitted to the Department as a result of the requirements of this permit, or otherwise violates the provisions of this permit, shall be subject to enforcement and penalties pursuant but not limited to A.R.S. 36-1864.01.

PBR MINERALS

==========

(G-0020-02) This is a cyanide leaching operation addressing mining activities from the site formerly known as the Contention Mine, Tombstone Exploration, Inc. (TEI), Cochise Silver Mine (Permit No. #G-0020-20); PBR MINERALS (Temporary Permit #G-0019-2T).

++

THINGS TO FIND

R 1. Quarterly Interpretive Analysis for ~~2d~~ and 4th quarter of 1989 and for 1st, 2d, 3d and 4th quarter of 1990.

R ~~2. QNCR results~~
   a. daily water ballance
   b. daily solution levels in pregnant pond, barren, neutral & storm water ponds.
   c. weekly leak collection sampling points
   d. 3 rounds of ambient groundwater monitoring

R 3. Sampling of wells # 1, 2 and 3-

Sample	Frequency	level mg/l
Cyanide	Quarterly	0.20
Hg	"	0.002
Ar	"	0.05
Pb	"	0.05
Ag	"	0.05
Nitrate	"	10.0
pH	Monthly	n/a
Ca	"	n/a
Cl	"	n/a
Mg	"	n/a
K	"	n/a
Na	"	n/a
Sulfite	"	n/a
TDS	"	n/a
Zn	"	n/a

R 4. Flexable field seam testing

✓ 5. The amount of neutralized tailings (units?) 4?

✓M 6. Post closure plan

✓M 7. Complete a site assessment & closure report for the remediation of well #2.

M 8. Monthly monitoring for No3-N and CN (total and free) for well #1, 2 and 3.

R 9. NPDES permit?

10. Cyanide Training Course for employees (Proof) - didn't find

THINGS THAT MUST BE AFTER ISSUANCE OF THE PERMIT

Within 3 months- submit pump tests for wells # 1 and 2: historical records of well #2.

Within 6 months- submit Interpretive Aquifer Characteristics

Within 9 months- the installation of additional monitoring wells.

Within 12 months- submit a closure report

INTERPRETIVE ASSESSMENT REPORT
PBR REPORTING REQUIREMENTS

==========

{II.B.2.a.} Flexible membrane field seam testing results

{II.B.2.b.} **Weekly** testing for pH and Cyanide @ the heap leach pad.
Weekly testing for pH and Cyanide pregnant & barren pond.

{II.B.2.c.} Analytical results from neutralized tailings
Amount of neutralized tailings

{II.B.2.e.} Quarterly analytical results with MGL's
Monthly analytical results without MGL's

==========

Post closure plan

WITHIN 3 MONTHS
1. Complete aquifer testing (pump test) of TEI well #2 ~~and submit historical data of TEI well #2.~~

WITHIN 6 MONTHS
1. Water table showing groundwater flow directions
2. Aquifer testing results for TEI well #2.
3. Water quality data for all on-site groundwater wells issuance of permit.
4. Proposed locations for a minimum of two groundwater monitoring wells.

WITHIN 9 MONTHS
1. The installation of the two additional groundwater monitoring wells shall have been completed.

WITHIN 12 MONTHS
1. Submit a closure report.

CERTIFIED MAIL:
Return Receipt Requested

Ref:
December , 1990

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

On January 20, 1989, Grand Central Leaching Facility, dba, PBR Minerals was issued a Groundwater Protection Permit (#G-0020-02) by the Department of Environmental Quality. The permit addresses mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit #G-0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements.

Based on the information given above, the Water Pollution Compliance Unit (WPCU) has determined that the following Arizona State Statutes and rules may have been violated in the operation of the operation of the referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6	The pollution or contamination of any domestic waters.

Arizona Revised Statutes (A.R.S.) §49-141.8.	The disposal and reclamation of trash and wastes other than as provided by law and rule.
Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.
Arizona Revised Statutes (A.R.S.) §49-263.A.4.	Violation of a water quality standard.
Arizona Administrative Code (A.A.C.) R18-9-103.B.	Failure to comply with all terms and conditions of the permit.
Arizona Administrative Code (A.A.C.) R18-4-803.A.	Industrial wastes shall not be permitted upon or under any of the lands of the State in a manner detrimental to the quality of the or the use of the receiving lands.
Arizona Administrative Code	No effluent from any waste treatment device shall be discharged in a rock formation which will or may permit or contamination of groundwater.

In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, and for the first, second, third and fourth quarter of 1990 required by Section II.B.2. of your permit. The information submitted must include:

   1. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

   2. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

3. Results from weekly leak detection monitoring.

4. Records of all neutralized spent ore sampling locations.

5. Results from groundwater monitoring required by Section II.B.1.E. and II.B.2.e.1-2.

6. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture holes.

7. Submit the results of three (3) rounds of ambient groundwater monitoring for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

B. Within forty-five (45) days upon receipt of this letter, submit a proposed, "Monitoring Well Installation Work Plan" with completion dates for each activity and address the following:

1. Redrilling or replacement of TEI Well #3.

2. Proposed sites for the required two (2) passive wells.

3. The time required to complete drilling of the monitoring wells once ADEQ approves proposed monitoring well locations.

4. Submittal of the well driller's logs for each completed well as well as the groundwater quality data for each of these wells.

5. A description of the method(s) used with a schedule of implementation to remediate TEI Well #2 contamination.

All documents or reports shall be submitted to:

Arizona Department of Environmental Quality
Water Pollution Compliance Unit - Room 305
2005 North Central Avenue
Phoenix, Arizona 85004
Attention: Russell A. Smith

You are advised that this letter does not constitute a formal administrative or legal action by our Department. It is intended to notify you of the violations observed at Grand Central Leaching Facility, dba PBR Minerals, Inc., and the appropriate corrective actions necessary to achieve compliance with State requirements.

Failure to take the actions listed above may result in administrative or legal actions by our Department or the Arizona Attorney's General Office. No other warnings will be issued in this matter. If you have any questions or would like to schedule a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact me at (602) 257-2364. For technical questions, you may contact Department's Southern Regional Office at (602) 628-5321. Thank you for your attention in this matter.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: Sarah L. Mapes, Manager, Compliance Section, ADEQ
Reza Azizi, Acting Unit Manager, WPCU
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department

DEC - 1990

PBR MINERALS

==========

(G-0020-02) Thi is a cyanide leaching operation addressing mining activities from the site formerly known as the Contention Mine, Tombstone Exploration, Inc. (TEI), Cochise Silver Mine (Permit No. #G-0020-20); PBR MINERALS (Temporary Permit #G-0019-2T).

++

THINGS TO FIND

1. Quarterly Interpretive Analysis for 3d and 4th quarter of 1989 and for 1st, 2d, 3d and 4th quarter of 1990.

2. QNCR results
   a. daily water ballance
   b. daily solution levels in pregnant pond, barren, neutral & storm wa`terponds.
   c. weekly leak collection sampling points
   d. 3 rounds of ambient groundwater monitoring

3. Sampling of wells # 1, 2 and 3-

	Sample	Frequency	level mg/l
	Cyanide	Quarterly	0.20
	Hg	"	0.002
	Ar	"	0.05
	Pb	"	0.05
	Ag	"	0.05
	Nitrate	"	10.0
X	pH	Monthly	n/a
	Ca	"	n/a
	Cl	"	n/a
	Mg	"	n/a
	K	"	n/a
	Na	"	n/a
	Sulfite	"	n/a
	TDS	"	n/a
	Zn	"	n/a

4. Flexable field seam testing

5. The amount of neutralized tailings (units?)

6. Post closure plan

7. Complete a site assessment & closure report for the remediation of well #2.

8. Monthly monitoring for No3-N and CN (total and free) for well #1, 2 and 3.

~~9. NPDES permit?~~

THINGS THAT MUST BE AFTER ISSUANCE OF THE PERMIT

~~Within 3 months- submit pump tests for wells # 1 and 2: historical records of well #2.~~

~~Within 6 months- submit Interpretive Aquifer Characteristics~~

Within 9 months- the installation of additional monitoring wells.

Within 12 months- submit a closure report

PBR Minerals - Tombstone

Drafted WH 3/1/91

Several Facilities

Cont. of Cyanide & Mercury

Hydrol - Jim Durrell Sampled

Water Quality Violations

G.N Pk Permit

- are they in Compliance?

- More Problems

Review & Develop — — — — — — — —

Did not install monitor wells

" " submit Reports

Check Compliance Tracking in Computer

Develop Disposition -

000377

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Office Memorandum

Ref:
March 20, 1991

To: Reza Azizi, Acting Manager
Tim Levandowsky, Acting Team Leader
Water Pollution Compliance Unit

From: Russ Smith, Compliance Officer RS
Water Pollution Compliance Unit

RE: PBR Minerals, Inc; Permit (#G-0020-02)
Requirements and Groundwater Remediation

The attached warning letter was developed with the assistance of Water Permits. On March 19, I met with Roger Kennett for approximately two (2) hours reviewing the case and identifying possible violations.

Any comments you have are welcome.

Reza, please review this letter, Russ has spent alot of time with Roger Kennett to develop the letter, we should have Roger review the final draft before we send it. Because of the complexity of the permit I believe we should work ~~very~~ more closely with WPCU than we usually do. I also believe this case could go to court as it is likely that many of the permit requirements were never done and they may be unable to perform them now.

Tim 4/10

000378

CERTIFIED MAIL
Return Receipt Requested

Ref:
March , 1991

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

On January 20, 1989, Grand Central Leaching Facility, dba, PBR Minerals was issued a Groundwater Protection Permit (#G-0020-02) by the Department of Environmental Quality. The permit addresses mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit #G-0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

Need to specify permit violations (Russ, list permit violations)

Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements.

Based on the ~~information given above~~ review of Department records, the Water Pollution Compliance Unit (WPCU) has determined that the following Arizona State Statutes and rules may have been violated in the operation of the above referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6	The pollution or contamination of any domestic waters.
Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.

Arizona Revised Statutes (A.R.S.) §49-263.A.4.	Violation of a water quality standard.
Arizona Administrative Code (A.A.C.) R18-9-103.B.	Failure to comply with all terms and conditions of the permit.
Arizona Administrative Code (A.A.C.) R18-9-815	No effluent from any waste treatment device shall be discharged in a rock formation which will or may permit or contamination of groundwater.

I believe this applies to seepage systems

In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, and for the first, second, third and fourth quarter of 1990 required by Section II.B.2. of your permit. The information submitted must include:

1. ~~Submit information describing the~~ activity status of the facility since January 20, 1989.

2. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from groundwater monitoring required by Section II.B.1.E. and II.B.2.e.1-2.

7. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture holes.

8. ~~Submit the~~ Results of three (3) rounds of ambient groundwater monitoring for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

B. Within forty-five (45) days upon receipt of this letter, submit a proposed, "Monitoring Well Installation Work Plan" with completion dates for each activity and address the following:

1. Redrilling or replacement of TEI Well #3.

2. Proposed sites for the required two (2) passive wells.

3. The time required to complete drilling of the monitoring wells once ADEQ approves proposed monitoring well locations.

4. Submittal of the well driller's logs for each completed well as well as the groundwater quality data for each of these wells.

C. Within forty-five (45) days of receipt of this letter ~~B.~~ Submit a closure report addressing all remedial activities, and any further actions needed to establish compliance with this permit.

All documents or reports shall be submitted to:

Arizona Department of Environmental Quality
Water Pollution Compliance Unit - Room 305
2005 North Central Avenue
Phoenix, Arizona 85004
Attention: Russell A. Smith

You are advised that this letter does not constitute a formal administrative or legal action by our Department. It is intended to notify you of the violations observed at Grand Central Leaching Facility, dba PBR Minerals, Inc., and the appropriate corrective actions necessary to achieve compliance with State requirements.

Failure to take the actions listed above may result in administrative or legal actions by our Department or the Arizona Attorney's General Office. No other warnings will be issued in this matter. If you have any questions or would like to schedule a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact

or Water Permits Unit at 257-

me at (602) 257-2364. For technical questions, you may contact Department's Southern Regional Office at (602) 628-5321. Thank you for your attention in this matter.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: Sarah L. Mapes, Manager, Compliance Section, ADEQ
Reza Azizi, Acting Unit Manager, WPCU
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department

DRAFT

FOR DISCUSSION PURPOSES ONLY

CERTIFIED MAIL
Return Receipt Requested

Ref:
April , 1991

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

On January 20, 1989, Grand Central Leaching Facility, dba, PBR Minerals was issued a Groundwater Protection Permit (#G-0020-02) by the Department of Environmental Quality. The permit addresses mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit #G-0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements. The following are possible violations of your permit:

Rounded

4. "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, and for the first, second, third and fourth quarter of 1990 required by Section II.B.2. of your permit have not been submitted.

   1. Information describing the activity status of the facility since January 20, 1989 has not been submitted.

   2. Flexible field seam testing results by a lining contractor or field service representative has not been submitted.

DRAFT ①
FOR DISCUSSION PURPOSES ONLY

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond has not been submitted.

4. Results from weekly leak detection monitoring has not been submitted.

5. Records of all neutralized spent ore sampling locations has not been submitted.

6. Results from weekly monitoring for free cyanide and pH from the leak collection sumps have not been submitted.

7. No evidence has been submitted concerning the required remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture holes.

8. The results of three (3) rounds of ambient groundwater monitoring for establishing, "maximum groundwater limits (MGL) and "alert level limits" has not been submitted.

Based on a review of Department records, the Water Pollution Compliance Unit (WPCU) has determined that the following Arizona State Statutes and rules may have been violated in the operation of the above referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6	The pollution or contamination of any domestic waters.
Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.
Arizona Revised Statutes (A.R.S.) §49-263.A.4.	Violation of a water quality standard.
Arizona Administrative Code (A.A.C.) R18-9-103.B.	Failure to comply with all terms and conditions of the permit.

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FOR DISCUSSION PURPOSES ONLY

In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, and for the first, second, third and fourth quarter of 1990 required by Section II.B.2. of your permit. The information submitted must include:

1. Activity status of the facility since January 20, 1989.

2. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from groundwater monitoring required by Section II.B.1. and II.B.2.e.

7. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture holes.

8. Results of three (3) rounds of ambient groundwater monitoring for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

B. Within forty-five (45) days upon receipt of this letter, submit a proposed, "Monitoring Well Installation Work Plan" with completion dates for each activity and address the following:

1. Redrilling or replacement of TEI Well #3.

2. Proposed sites for the required two (2) passive wells.

DRAFT (3)
FOR DISCUSSION PURPOSES ONLY

3. The time required to complete drilling of the monitoring wells once ADEQ approves proposed monitoring well locations.

4. Submittal of the well driller's logs for each completed well as well as the groundwater quality data for each of these wells.

C. Within forty-five (45) days of receipt of this letter, submit a closure report addressing all remedial activities, and any further actions needed to establish compliance with this permit.

All documents or reports shall be submitted to:

Arizona Department of Environmental Quality
Water Pollution Compliance Unit - Room 305
2005 North Central Avenue
Phoenix, Arizona 85004
Attention: Russell A. Smith

You are advised that this letter does not constitute a formal administrative or legal action by our Department. It is intended to notify you of the violations observed at Grand Central Leaching Facility, dba PBR Minerals, Inc., and the appropriate corrective actions necessary to achieve compliance with State requirements.

Failure to take the actions listed above may result in administrative or legal actions by our Department or the Arizona Attorney's General Office. No other warnings will be issued in this matter. If you have any questions or would like to schedule a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact me at (602) 257-2364. ~~For technical questions, you may contact Department's Southern Regional Office at (602) 628-5321.~~ Thank you for your attention in this matter.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: Sarah L. Mapes, Manager, Compliance Section, ADEQ
Reza Azizi, ~~Acting Unit Manager~~, WPCU Team Leader
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department

DRAFT ③

FOR DISCUSSION PURPOSES ONLY

CERTIFIED MAIL
Return Receipt Requested

Ref:
May , 1991

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

On January 20, 1989, Grand Central Leaching Facility, dba, PBR Minerals was issued a Groundwater Protection Permit (#G-0020-02) by the Department of Environmental Quality. The permit addresses mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit #G-0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements. The following are possible violations of your permit:

A. "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, and for the first, second, third and fourth quarter of 1990 required by Section II.B.2. of your permit have not been submitted.

2. Information describing the activity status of the facility since January 20, 1989 has not been submitted.

3. Flexible field seam testing results by a lining contractor or field service representative has not been submitted.

000387

DRAFT (3)
FOR DISCUSSION PURPOSES ONLY

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond has not been submitted.

4. Results from weekly leak detection monitoring has not been submitted.

5. Records of all neutralized spent ore sampling locations has not been submitted.

6. Results from weekly monitoring for free cyanide and pH from the leak collection sumps have not been submitted.

7. No evidence has been submitted concerning the required remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture holes.

8. The results of three (3) rounds of ambient groundwater monitoring for establishing, "maximum groundwater limits (MGL) and "alert level limits" has not been submitted.

B

Based on a review of Department records, the Water Pollution Compliance Unit (WPCU) has determined that the following Arizona State Statutes and rules may have been violated in the operation of the above referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6.	The pollution or contamination of any domestic waters.
Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.
Arizona Revised Statutes (A.R.S.) §49-263.A.4.	Violation of a water quality standard.
Arizona Administrative Code (A.A.C.) R18-9-103.B.1.	Failure to comply with all terms and conditions of the permit.

B. Evidence of required remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture.

000388

See back of page

C. Evidence for installation of the two additional monitor wells, including well

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In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, and for the first, second, third and fourth quarter of 1990 required by Section II.B.2. of your permit. The information submitted must include:

1. Activity status of the facility since January 20, 1989.

2. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from groundwater monitoring required by Section II.B.1. and II.B.2.e.

7. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by puncture holes.

8. Results of three (3) rounds of ambient groundwater monitoring for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

B. Within forty-five (45) days upon receipt of this letter, submit a proposed, "Monitoring Well Installation Work Plan" with completion dates for each activity and address the following:

1. Redrilling or replacement of TEI Well #3.

~~2. Proposed sites for the required two (2) passive wells.~~

DRAFT (3)
FOR DISCUSSION PURPOSES ONLY

3. The time required to complete ~~drilling~~ installation of the two additional monitoring wells ~~once ADEQ approves proposed monitoring well locations.~~ as required by Part II.E.4 of your permit.
4. Submittal of the wells drillers logs for each completed well as well as the groundwater quality data for each of these wells.

C. Within forty-five (45) days of receipt of this letter, submit a closure report addressing all remedial activities, and any further actions needed to establish compliance with this permit.

All documents or reports shall be submitted to:

Arizona Department of Environmental Quality
Water Pollution Compliance Unit - Room 305
2005 North Central Avenue
Phoenix, Arizona 85004
Attention: Russell A. Smith

You are advised that this letter does not constitute a formal administrative or legal action by our Department. It is intended to notify you of the violations observed at Grand Central Leaching Facility, dba PBR Minerals, Inc., and the appropriate corrective actions necessary to achieve compliance with State requirements.

Failure to take the actions listed above may result in administrative or legal actions by our Department or the Arizona Attorney's General Office. No other warnings will be issued in this matter. If you have any questions or would like to schedule a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact me at (602) 257-2364. Thank you for your attention in this matter.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: Sarah L. Mapes, Manager, Compliance Section, ADEQ
Reza Azizi, Team Leader, WPCU
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department

Russ: Have you looked at SMRF generated by Tracking Team? Do they have one? Has facility submitted any data on these new SMRF forms?

CERTIFIED MAIL
Return Receipt Requested

Ref:
June , 1991

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

On January 20, 1989, Grand Central Leaching Facility, dba, PBR Minerals was issued a Groundwater Protection Permit (#G-0020-02) by the Arizona Department of Environmental Quality (ADEQ). The permit addresses mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit #G-0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements. The ADEQ's records indicate that the following information and reports as required by the above-referenced Permit have not been submitted to the Department.

Russ: check to see if any reports have been received or 2nd quarter 91

A. "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, through the ~~first~~ second quarter of 1991.

1. Information describing the activity status of the facility since January 20, 1989.

2. Flexible field seam testing results by a lining contractor or field service representative.

Deadline for second quarter submittal is ~~June 30~~ Aug. 15. You may have to visit until Friday 8-2-91 before sending this letter out.

DRAFT ②

FOR DISCUSSION PURPOSES ONLY

6/11/91

Reza,

Here is a revised draft warning letter for PBR. Note the bold print. I believe they have submitted 3 required rounds of ambient groundwater sampling, eventhough it appear TEI #4 was placed into operation prior to the completion of sampling. Part II.B.i.d., never says "prior to operation". See if you agree. See Jim Dubois report dated 7/31/89.

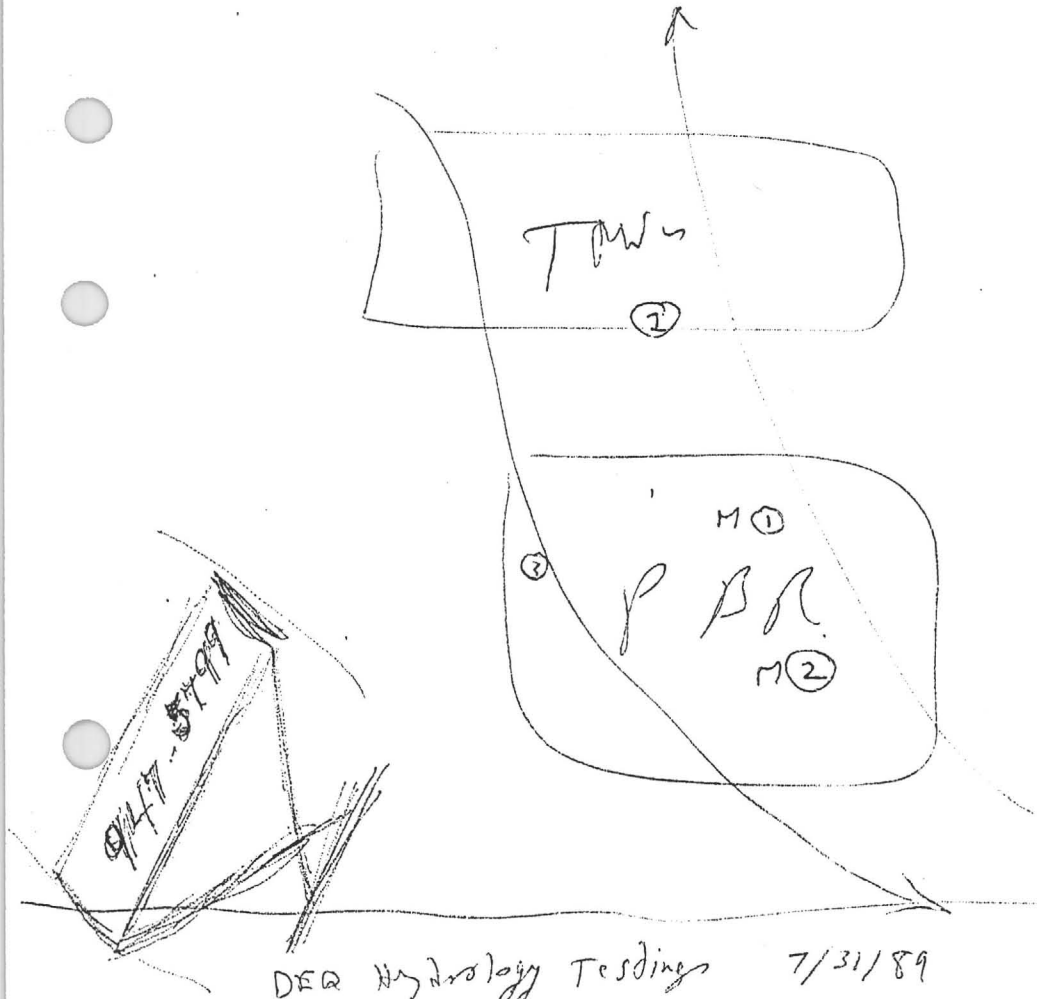
(20) Levels Russ

① Have MGLs + Alert Levels been established?

page 14

② See part II. E. 1.

000392



DEQ Hydrology Testings 7/31/89

WELL	Nitrate (mg/l)	Total cyanide (mg/l)	Mercury (mg/l)
City well #1	9.13	0.052	<.0005
(Duplicate) " " #1	8.85	0.052	<.0005
" " #2	2.84	<0.045	<.0005
" #3	3.34	<0.045	<.0005
City Reservoir	<0.10	<0.045	<.0005
MW 1	2.02	0.049	0.0072
MW2	23.40	0.115	0.0183
(Duplicate) MW2	22.80	0.124	0.0184
~~MCL/HBGL~~ MCL/HBGL		0.220	

000393

CERTIFIED MAIL
Return Receipt Requested

Ref:
July 27, 1991

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

On January 20, 1989, Grand Central Leaching Facility, dba, PBR Minerals was issued a Groundwater Protection Permit (#G-0020-02) by the Arizona Department of Environmental Quality (ADEQ). The permit addresses mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit #G-0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements. The ADEQ's records indicate that the following information and reports as required by the above referenced Permit have not been submitted to the Department.

A. "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, through the fourth quarter of 1991.

   1. Information describing the activity status of the facility since January 20, 1989.

   2. Flexible field seam testing results by a lining contractor or field service representative.

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from weekly monitoring for free cyanide and pH from the leak collection sumps.

7. The results of three (3) rounds of ambient groundwater monitoring from pumping well #1 (TEI #4, PBR Well #4) for establishing, "maximum groundwater limits (MGL) and "alert level limits".

B. Evidence of required remediation (correction) measures taken concerning the April 1989 pregnant pond solution leak caused by lining puncture.

C. Evidence for installation of the additional monitoring wells (Down-Gradient Passive and Up-Gradient Passive), including well drilling logs and groundwater quality data for each of these wells.

D. Results of continued monitoring of TEI #1, #2, #3 and monitoring wells (Part II.E.).

E. A closure report addressing all remedial activities including but not limited to the required site assessment and closure report for TEI Well #2.

F. After exceeding the maximum groundwater limit (MGL) for Nitrate and Mercury on June 9, 1989, and July 31, 1989, as set forth in Part II.C, of the permit, the required scope of work addressing corrective and remedial actions set forth in Part II.C.1., of the permit was not submitted.

G. Leaching operations began before TEI Well #4 was sampled.

Based on a review of Department records, the Water Pollution Compliance Unit (WPCU) has determined that the following Arizona State Statutes and rules may have been violated in the operation

of the above referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6	The pollution or contamination of any domestic waters.
Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.
Arizona Administrative Code (A.A.C.) R18-9-103.B.1.	Failure to comply with all terms and conditions of the permit.

In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, through the second quarter of 1991 as required by Section II.B.2. of your permit. The information submitted must include:

1. Activity status of the facility since January 20, 1989.

2. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from groundwater monitoring as required by Section II.B.1. and II.B.2.e.

7. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by a lining puncture.

8. Results of three (3) rounds of ambient groundwater monitoring from TEI Well #4 for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

9. Records regarding the installation of the two (2) additional (upgradient and downgradient) monitoring wells as required by Part II.E.4., including drillers logs, DWR Registration Numbers, locations, and three (3) rounds of groundwater quality data as required by Part.B.1.d., of the permit.

10. Monthly water quality results from continued monitoring of TEI Wells #1, #2, and #3 monitoring wells as required by Part II.E., of the permit.

11. Closure report.

B. Within forty-five (45) days upon receipt of this letter, submit a proposed, "Monitoring Well Installation Work Plan" with completion dates for each activity and address the following:

1. Redrilling or replacement of TEI Well #3.

2. Installation of the two monitoring wells as required by Part II.E.4., of your permit.

3. Submittal of the well's driller logs for each completed well as well as the groundwater quality data for each of these wells.

C. Within sixty (60) days of receipt of this letter, submit a closure report addressing all remedial activities including but limited to a site assessment and closure report for TEI #2.

D. Within seventy (70) days of receipt of this letter, submit a scope of work addressing corrective and remedial actions concerning results of laboratory analyses submitted on June 9, 1989, and July 31, 1990, for Mercury and Nitrate which exceeded the maximum groundwater limit (MGL) as required by Part II.C.1, of the permit.

All documents or reports shall be submitted to:

Arizona Department of Environmental Quality
Water Pollution Compliance Unit - Room 305
2005 North Central Avenue
Phoenix, Arizona 85004
Attention: Russell A. Smith

You are advised that this letter does not constitute a formal administrative or legal action by our Department. It is intended to notify you of the violations observed at Grand Central Leaching Facility, dba PBR Minerals, Inc., and the appropriate corrective actions necessary to achieve compliance with State requirements.

Failure to take the actions listed above may result in administrative or legal actions by our Department or the Arizona Attorney's General Office. No other warnings will be issued in this matter. If you have any questions or would like to schedule a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact me at (602) 257-2364.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: David Woodruff, Acting Manager, Compliance Section, ADEQ
Reza Azizi, Acting Manager, WPCU
Tim Levandowsky, Acting Team Leader, WPCU
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department
Jim Dubois, State Programs Hydrology Unit

Call Friday morning

Arizona Department of Environmental Quality

Date 7/9-92

TO Roger

FROM Bill Engstrom

- [ ] Review
- [ ] Note and see me
- [ ] Note and Return
- [ ] Comment
- [ ] Per Conversation
- [ ] As Requested
- [x] Necessary Action
- [ ] Information

REMARKS: Please call Jim Brisco @ (602) 721-1375 Jabba Inc. regr geologist

1) PBR Minerals – taken over by another Co. then went to bankruptcy.

2) In bankruptcy court – court decree – Excelon has taken over the lease and Jim represents Excelon

ADEQ/STOCK 101 (4-87)

- Excelon taking over mining lease from PBR Minerals
- PBR Minerals has filed bankruptcy (x 2 yrs. -3yrs. ago.) (1988-89?
- Excelon – Canadian Co.
  - plan on exploration work, then maybe operations (nothing for at least one year)
- what is current status of GWQPP & compliance case? – check w/ R.K. Pebra & WPCII – check back w/ Jim Brisco – ASAP
- no current heap – hypochlorite has been added, remaining CN has been removed – non-operating status

000399

7-9-92

PBR Cowichan ~~Minerals~~ Resources Inc.

Successor to PBR Minerals:

Visit w/ Jim Baisco 7/12/92 10:30 AM

- Deadline for Bankruptcy Court → come & gone

Case # 9001989-TUC-LO

Gigantic File in Court clerks office

Judge: Lawrence Ollason.

Bankruptcy Claim date come & gone

Aug 24th, 1992. last date ??

Excellon will receive lease from tombstone develop cooperation.

Michael Ashworth dying or dead of Cancer. if alive in Dallas Texas

PBR has lease as its only asset!

Lawyer in Tucson =

No Management from PBR & has not been

000400

Michael Ashworth set in place by
bankruptcy Court

Jim Briscoe:

PBR Taken over by another Co

Still Owned by Tombstone Development Corp!

Jan 87 – Temp Permit

to Cochise Silver Mines
4831 N 42nd Ave
PHX. Az 85019

Temporary for 1 yr.
Permit 6-0011-02
Jan 87

FRANK Mugini – Now out of it. –

TEI = Tombstone Exploration Inc

Nevada Trade Permit

Tom _____ ?

he filled Bankruptcy –

So Frank Mugini & Dusty Scapule
started Cochise Silver Mines
after Finnie Robbins

Jan 89

The PBR Minerals
issued a Ground Contact leaching permit for
6-0020-02

000402

All these People are

Now Excelon —

Jim Briscoe 602-721-1375

Need Built

1986 ~~Mr. LaVerne Brater~~ Jerry Needfelt passed away Owners

Tombstone Development Co

P. O. Box 1445

Grand Island Nebraska 68803

Jim Briscoe Registered Geologist.

Jabba Inc Registered Geologist

602-721-1375

Jabba in Accession!

Lawyer for

Lowell E. Rothschild - Tucson

259 N. Meyer

Tucson, Az 85701

Mesch Clarke & Rothschild

000403

~~Section~~ Part ~~II~~ III. H. 3

~~Page 1 of 2~~ Permit Transfer Conditions

Page 26

Within 30 days ~~of~~ prior.

closure R9-20-206.D.2
R9-20-216.C2

Jim Briscoe
Jabt Inc
2100 N Wilmot Rd
Tucson 85712

} copy of Permit

IRS. wanted to Title - But No assets -

Submersible Pumps - No Power
- AEA Removed Trans Covers

Excellon told all cyanide killed
No active cyanide on property.

Aug 24 Excellon will take over
Bankruptcy Court has approved plan
to expose —

Exploration —
- compilation of all the old data
- then exploration drill holes
Water level 600 feet

7/29/91 ?

Roger,
Would you review this final draft for accuracy.
I am concerned about my reference to TEI Well #4
as the monitoring well referred to in Part II. B.1.d
of the permit. Is it the correct reference. ?
Sort of. See my comments. It is
confusing, I think by their design
Russ Smith
Due Aug 5 RK 8/5/91 2364

Ref:

, 1991

J. Michael Ashworth,
PBR Minerals, Inc.
P.O. Box 370
Tombstone, Arizona 85638

Re: PBR Minerals, Inc.; Permit (#G-0020-02); Compliance Requirements and Groundwater Remediation

Dear Mr. Ashworth:

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Permit (#G-0020-02) was designed to address mercury, nitrate and cyanide contamination of TEI Well #2; mercury and nitrate contamination of TEI Well #3; and potential cyanide, nitrate and mercury contamination of groundwater supplies for the City of Tombstone. The permit also establishes maximum groundwater contamination limits, alert levels for the mine leaching operations, remediation of TEI Well #2, a compliance schedule for site assessment and closure report addressing all remedial activities and monitoring and reporting requirements. The ADEQ's records indicate that the following information and reports as required by the above referenced Permit have not been submitted to the Department.

A. "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, through the fourth quarter of 1991. ( ) should we site the sections of the permit for reference)

1. Information describing the activity status of the facility since January 20, 1989.

2. Flexible field seam testing results by a lining contractor or field service representative.

DRAFT
FOR DISCUSSION PURPOSES ONLY

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from weekly monitoring for free cyanide and pH from the leak collection sumps.

The permit calls it
1 Pumping Well
WR Reg # 55-523032-C
aka TEI #4 / PBR Well #4

7. The results of three (3) rounds of ambient groundwater monitoring from TEI #4 for establishing, "maximum groundwater limits (MGL) and "alert level limits".

B. Evidence of required remediation (correction) measures taken concerning the April 1989 pregnant pond solution leak caused by lining puncture.

C. Evidence for installation of the additional monitoring wells (Down-Gradient Passive & Up-Gradient Passive), including well drilling logs (Registration Nos., location) and groundwater quality data for each of these wells.

D. Results of continued monitoring of TEI #1, #2 and #3 monitor wells (Part II.G)

~~D.~~ E. A closure report addressing all remedial activities including but not limited to the required site assessment and closure report for TEI Well #2.

~~E.~~ F. After exceeding the maximum groundwater limit (MGL) for Nitrate and Mercury on June 9, 1989, and July 31, 1989, as set forth in Part II.C, of the permit, the required scope of work addressing corrective and remedial actions set forth in Part II.C.1., of the permit was not submitted.

~~F.~~ G. ~~TEI Well #4~~ was placed into service ~~for~~ the facilit~~ies~~y's leaching operation prior to the completion of the required alert levels being established for TEI Well #4

Do you mean
leaching operations
began before Well #4 was sampled?

Based on a review of Department records, the Water Pollution Compliance Unit (WPCU) has determined that the following Arizona State Statutes and rules may have been violated in the operation of the above referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6	The pollution or contamination of any domestic waters.

DRAFT
FOR DISCUSSION PURPOSES ONLY

Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.
Arizona Administrative Code (A.A.C.) R18-9-103.B.1.	Failure to comply with all terms and conditions of the permit.

In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, through the second quarter of 1991 as required by Section II.B.2. of your permit. The information submitted must include:

1. Activity status of the facility since January 20, 1989.

2. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

4. Results from weekly leak detection monitoring.

5. Records of all neutralized spent ore sampling locations.

6. Results from groundwater monitoring as required by Section II.B.1. and II.B.2.e.

7. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by a lining puncture.

8. Results of three (3) rounds of ambient groundwater monitoring from TEI Well #4 for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

000408

9. Records regarding the installation of the two (2) additional (Up-Gradient and Down-Gradient Passive) monitor wells (as required by Part II.E.4) including driller's logs, DWR Registration Numbers, locations, and three rounds of groundwater quality data as required by Part II.B.1.d.

10. Monthly water quality results from continued monitoring at TEI #1, #2 and #3 monitor wells as required by Part II.E.

DRAFT
FOR DISCUSSION PURPOSES ONLY

Missing something here

a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact me at (602) 257-2364.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: David Woodruff, Acting Manager, Compliance Section, ADEQ
Reza Azizi, Acting Manager, WPCU
Tim Levandowsky, Acting Team Leader, WPCU
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department
Jim DuBois, ~~Hydro~~ State Programs Hydrology Unit

of the above referenced facility.

Regulatory Citation	Violations
Arizona Revised Statutes (A.R.S.) §49-141.6	The pollution or contamination of any domestic waters.
Arizona Revised Statutes (A.R.S.) §49-263.A.3.	Failure to monitor, sample or report as required by a permit.
Arizona Administrative Code (A.A.C.) R18-9-103.B.1.	Failure to comply with all terms and conditions of the permit.

In order to bring the Grand Central Leaching Facility, dba PBR Minerals into compliance with State statutes and environmental rules, the WPCU requires that the following activities be performed within the time-frames indicated below:

A. Within thirty (30) days upon receipt of this letter, submit the "Quarterly Interpretive Assessment Report(s)" for each quarter beginning with the fourth quarter of 1989, through the second quarter of 1991 as required by Section II.B.2. of your permit. The information submitted must include:

   1. Activity status of the facility since January 20, 1989.

   2. Results of flexible field seam testing by a lining contractor or field service representative which has successfully installed a minimum of five (5) million square feet of flexible membrane lining.

   3. Results from daily leach solution monitoring for the pregnant pond, barren pond, neutralization pond and the storm water back-up pond.

   4. Results from weekly leak detection monitoring.

   5. Records of all neutralized spent ore sampling locations.

   6. Results from groundwater monitoring as required by Section II.B.1. and II.B.2.e.

   7. Remediation measures taken concerning the April 1989 pregnant pond solution leak caused by a lining puncture.

8. Results of three (3) rounds of ambient groundwater monitoring from TEI Well #4 for establishing, "maximum groundwater limits (MGL) and "alert level limits" required by Section II.B.1.d., of your permit.

9. Records regarding the installation of the two (2) additional (upgradient and downgradient) monitoring we;;s as required by Part II.E.4., including drillers logs, DWR Registration Numbers, locations, and three (3) rounds of groundwater quality data as required by Part.B.1.d., of the permit.

10. Monthly water quality results from continued monitoring of TEI Wells #1, #2, and #3 monitoring wells as required by Part II.E., of the permit.

11. Closure report.

B. Within forty-five (45) days upon receipt of this letter, submit a proposed, "Monitoring Well Installation Work Plan" with completion dates for each activity and address the following:

1. Redrilling or replacement of TEI Well #3.

2. Installation of the two monitoring wells as required by Part II.E.4., of your permit.

3. Submittal of the well's driller logs for each completed well as well as the groundwater quality data for each of these wells.

C. Within sixty (60) days of receipt of this letter, submit a closure report addressing all remedial activities including but limited to a site assessment and closure report for TEI #2.

D. Within seventy (70) days of receipt of this letter, submit a scope of work addressing corrective and remedial actions concerning results of laboratory analyses submitted on June 9, 1989, and July 31, 1990, for Mercury and Nitrate which exceeded the maximum groundwater limit (MGL) as required by Part II.C.1, of the permit.

All documents or reports shall be submitted to:

Arizona Department of Environmental Quality
Water Pollution Compliance Unit - Room 305
2005 North Central Avenue
Phoenix, Arizona 85004
Attention: Russell A. Smith

You are advised that this letter does not constitute a formal administrative or legal action by our Department. It is intended to notify you of the violations observed at Grand Central Leaching Facility, dba PBR Minerals, Inc., and the appropriate corrective actions necessary to achieve compliance with State requirements.

Failure to take the actions listed above may result in administrative or legal actions by our Department or the Arizona Attorney's General Office. No other warnings will be issued in this matter. If you have any questions or would like to schedule a meeting between yourself and this office to discuss any problems associated with the referenced facility, please contact me at (602) 257-2364.

Sincerely,

Russell A. Smith, Compliance Officer
Water Pollution Compliance Unit

cc: David Woodruff, Acting Manager, Compliance Section, ADEQ
Reza Azizi, Acting Manager, WPCU
Tim Levandowsky, Acting Team Leader, WPCU
Southern Regional Office
Skip Hellerud, WPU
Cochise County Health Department
Jim Dubois, State Programs Hydrology Unit

Something is real strange about dates here - Jerry is listed as president ~~yet~~ on this correspondence - yet according to notes the call was on 7/12/92 - a Sunday so must ~~of~~ have been 8/12/92 - it would appear to me some dates have been Doctored. looks like a good case of CYA

Return to Don Bell
Cubicle # 205/3033

CERTIFIED MAIL
Return Receipt Requested

August 5, 1992
REF:WP-92-

Jerry Neidfeldt, President
Tombstone Development Co.
P.O.Box 1445
Grand Island, Nebraska 68803

RE: PBR Minerals, Inc; Groundwater Protection Permit# G-0020-02; groundwater remediation and monitoring reports.

Dear Mr. Neidfeldt:

The Department of Environmental Quality (ADEQ) has received information that Excellon Resources, Inc., is becoming involved in the operation of the facility presently operating under Groundwater Protection Permit (GWPP) #G-0020-02. Our records show Tombstone Development Co. as the owners of this property. This permit addresses the mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit # G- 0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T & Permit # G-0020-02).

Either a transfer of the present permit (GWPP #G-0020-02) or the development of an Aquifer protection Permit will be required. In either case, a considerable amount of information and administration of permits will be needed to develop this transition. The timeliness of your intentions will be important to ADEQ in dealing with this matter.

The Department is concerned that violations of Arizona Revised Statutes (A.R.S.) §49-141.6 may have occurred involving the contamination of domestic waters. PBR Minerals is required to submit written monitoring reports concerning the sampling of the wells and other points.

Therefore, Tombstone Development Co. is required to contact me at (602)207-4613 within fifteen (15) calendar days of the date of this letter to arrange a technical assistance meeting. Failure to do so may result in administrative or possible judicial enforcement action pursuant to A.R.S. § 49-263 and 264.

Sincerely,

Donald Bell
Compliance Officer
Water Pollution Compliance Unit
Office of Water Quality

cc:
Arizona Department of Environmental Quality
Bob Munari, P.E., Manager, OWQ Compliance Section
Roger Kennett, Manager, OWQ, Mining ~~permits Section~~ APP Unit
Dorothy Hains, P.E., Water Pollution Control
Julie Majors, WPCU Tracking
Distributuion List
Jerry Neidfeldt, President, Tombstone Development Co.
Douglas Mckenzie, VP, Excellon Resources Inc.
Jerry Brisco, Representative, Excellon Resources Inc.
J. Michael Ashworth, President, PBR Minerals, Inc.

Attached:
Distributuion List

DB:DB:db

B:\TMBSTONE.15D

DISTRIBUTION LIST

Jerry Neidfeldt, President
Tombstone Development Co.
P.O.Box 1445
Grand Island, Nebraska 68803

Excelsior Resources Inc.
c/o Douglas Mckenzie, VP
Suite #200-20
Aidelaide St. East
Toronto
Ontario, Canada
M5C 2T6

Jerry Brisco, Representative
Excelsior Resources Inc.
c/o Jabba Inc.
2100 N. Wilmot
Tucson, Arizona 85712
(602)721-1375

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O.Box 370
Tombstone, Arizona 85638

CERTIFIED MAIL
Return Receipt Requested

August 5, 1992
REF:WP-92-

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O.Box 370
Tombstone, Arizona 85638

RE: PBR Minerals, Inc; Groundwater Protection Permit# G-0020-02; groundwater remediation and monitoring reports.

Dear Mr Ashworth:

The Department of Environmental Quality (ADEQ) has not received the reporting forms for the facilities operations for the past reporting dates for Groundwater Protection Permit #G-0020-02. The permit addresses the mining activities from the site that was formerly known as the Contention Mine; Tombstone Exploration, Inc.; Cochise Silver Mines, Inc. (Permit # G- 0011-02); and PBR Minerals, Inc. (Temporary Permit #G-0019-02T).

The Department is concerned that violations of Arizona Revised Statutes (A.R.S.) §49-141.6 may have occurred involving the contamination of domestic waters. PBR Minerals is required to submit written monitoring reports concerning the sampling of the wells and other points.

It is our understanding that the facility may be considering closing. The Department has not been informed of these activities nor kept up to date as to the status of these activities. The Department has determined that additional actions or clarification of actions taken by PBR Minerals may be necessary.

Therefore, PBR Minerals, Inc.is required to contact me at (602)207-4613 within fifteen (15) calendar days of the date of this letter to arrange a technical assistance meeting. Failure to do so may result in administrative or possible judicial enforcement action pursuant to A.R.S. § 49-263 and 264.

Sincerely,

Donald Bell
Compliance Officer
Water Pollution Compliance Unit
Office of Water Quality

cc:
Arizona Department of Environmental Quality
Bob Munari, P.E., Manager, OWQ Compliance Section
Roger Kennett, Manager, OWQ Mining permits Section
Dorothy Hains, P.E., Water Pollution Control
Julie Majors, WPCU Tracking
Distributuion List
Jerry Neidfeldt, President, Tombstone Development Co.
Douglas Mckenzie, VP, Excellon Resources Inc.
Jerry Brisco, Representative, Excellon Resources Inc.
J. Michael Ashworth, President, PBR Minerals, Inc.

Attached:
Distributuion List

DB:DB:db

B:\PBRMINER.15D

DISTRIBUTION LIST

Jerry Neidfeldt, President
Tombstone Development Co.
P.O.Box 1445
Grand Island, Nebraska 68803

Excellon Resources Inc.
c/o Douglas Mckenzie, VP
Suite #200-20
Aidelaide St. East
Toronto
Ontario, Canada
C 2T6

Jerry Brisco, Representative
Excellon Resources Inc.
c/o Jabba Inc.
2100 N. Wilmot
Tucson, Arizona 85712
(602)721-1375

J. Michael Ashworth, President
PBR Minerals, Inc.
P.O.Box 370
Tombstone, Arizona 85638

M E M O R A N D U M

DATE: August 11, 1992

TO: Patrick Cunningham, Chief Counsel
Environmental Enforcement Section
Office of the Attorney General

FROM: Brian Munson, Assistant Director
Office of Water Quality
Department of Environmental Quality

RE: Case Development Memorandum (CDM) for PBR Minerals, Inc.; Inventory Number 100334; Groundwater Protection Permit (GWPP) #G-0020-02; Cochise County, Arizona.

PBR Minerals is the leaseholder and permit holder for the mining and milling operations of the Grand Central leaching Facility located close (bordering property) to Tombstone, Arizona. The company has been in bankruptcy court for a period of over a year and final decree is due on August 24, 1992. At this time ADEQ would loose what little rights remain to become involved in the proceedings.

The facility has not complied with their reporting requirements and there was previous pollution on site. After exceeding the maximum groundwater limits for Nitrate and Mercury as set forth in part II.C of the permit, the required scope of work has not been addressed. The Arizona Department of Environmental Quality's Water Pollution Compliance Unit was developing the necessary warning letters when these facts emerged. The necessary monitoring data for wells, liners and heap leach piles, plus remediation evidence and closure reports, are needed to bring the facility into compliance with the State Environmental statutes and rules.

Involved in the findings of the court will be the rights to exploration for Excellon Company. The funds of which, if profits are generated, will be utilized to pay creditors.

We are requesting that you assign an attorney to this matter in order to review the case, determine any proposed actions and represent the department in any court action or negotiations concerning this matter. It is important that an attorney be assigned as expeditiously as possible. If you have any questions concerning this matter, please contact Don Bell of my staff, at 207-4613. Your assistance in this matter is appreciated.

DB:DB:db

#356

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

FIFE SYMINGTON, GOVERNOR
EDWARD Z. FOX, DIRECTOR

M E M O R A N D U M

TO: Patrick Cunningham, Chief Counsel
Environmental Enforcement Section
Office of the Attorney General

FROM: Edward Z. Fox
Director

DATE: August 11, 1992

RE: Case Development Memorandum (CDM) for PBR Minerals, Inc.; Inventory Number 100334; Groundwater Protection Permit (GWPP) #G-0020-02; Cochise County, Arizona.

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DB:DB:db
B:\PBR.CDM

The Department of Environmental Quality is An Equal Opportunity Affirmative Action Employer.

Post Office Box 600 Phoenix, Arizona 85001-0600

Recycled Paper

PBR MINERALS (INV. #100334)

Notes from telephone conversation with Jim Briscoe 8/12/92 10:30am
Jim is a registered Geologist with his own company:
Jaba, Inc.
2100 N. Wilmot Dr.
Tucson, Az. 85712

PBR Minerals, Inc. (permit address) (leaseholder)
950 Skyline Drive P.O.Box 370
Tombstone, Arizona 85638
Inventory #100334
Facility Name: Grand Cenrtral Leaching
Present Permit #G-0020-02 (GWPP)
Past President: J. Michael Ashworth (see below)

The property is still owned by the:
Tombstone Development Co.
P.O.Box 1445
Grand Island, Nebraska 68803
The past President of the company, Laverne Baxter, has passed away, and Mr. Jerry Needfeildt now represents the Tombstone Develoment Company.

AKA: Cowichan Resources, Inc.(successor to PBR Minerals).

Has been in Bankruptcy Court for a couple of years. The time for claims has supposedly come and gone.

Judge: Lawerence Ollason.
Case:#9001989-TUC-LO
has gigantic case file on this project in the court clerks office. Could be researched.

August 24, 1992 is the last date that the court will deal with this case. At this point the Excellon Company will be given authority to take over and explore. Exploration in this case will mean that Jim Briscoe's company will review a large compilation of old data concerning several thousand feet of underground tunnels and other works. They are evidently developing a three diminsional map of these facilities now. Eventially they will drill some test holes. Thewy are maintaining theat the water level is 600+ feet and that there will be no test holes that deep.

Excellon will receive lease from Tombstone Develoment Corporation.

Michael Ashworth, past listed president of the PBR Minerals, Inc., organization. He was set in place by the previous bankruptcy Court, when Tombstone Exploration Co., Inc. (TEI) went into bankruptcy.. He is supposedly either dead or dieing of cancer, and living in Dallas, Texas, if still alive.

TEI was the original company (never had a permit
Cochise Silver Mines, Mr./ Frank Magini and Dusty Escapule were officers at that time and were still around, took over from the above company after financial problems arose..

Cochise Silver Mines
4831 N. 42nd Ave.
Phoenix, Arizona.

They had Arizona Temporary GWPP #G-0011-02 for a period of a year (January 1987).

There is essentially no management from PBR and there has been none.

PBR's only asset supposedly is the lease from the Tombstone development Company. IRS wanted to file but there were no assets.

PBR's Lawyer in Tucson, is Lowell E. Rothchild
259 N Meyer
Tucson, Ariz. 85707
of Mesch, Clarke, and Rothchild Law firm.

There are still submersible pumps on site and no power (Rural Elec. has removed transformers.

Southwestern Exploration Associates

COUNTY NOTEBOOK RESEARCH SYSTEM

VOL. 1

GENERAL ARTICLES

CONSULTING SERVICES IN:

literature research
mineral exploration
geothermal exploration
geophysical exploration
multispectral aerial photography
space imagery search and retrieval
image enhancement and processing
remote sensing and interpretation
environmental studies

4500 E. Speedway, Suite 14
Tucson, Arizona 85712
(602) 795-6097

COUNTY NOTEBOOK INVENTORY LIST

Volume 1: County Summary Material

1. Mining District index map with USGS quadrangle overlay
2. County bibliography list with explanations
3. Target listing
4. Listing of all deposits with current exploration status
5. Map indexes to various commodities and a generalized land status map
6. County report by State Bureau of Mines
7. Information on industrial mineral occurrences within the county
8. General articles filed alphabetically, preceded by bibliography list
9. Metal price list

Volume 2: Thesis Material

1. Index map of available theses
2. Theses arranged alphabetically by author

Volume 3: U.S.G.S. Reduced Topographic Sheets

1. Reduced A.M.S. sheets
2. Reduced 7½ and 15 minute quad sheets with list of mines located on each quad sheet

Volume 4: U.S.G.S. Geologic, Geophysical, Geochemical and Open File Maps

1. Index to maps in Volume 4
2. Geologic maps
3. Geophysical maps
4. Geochemical maps
5. Photo index maps

Volume 5: Mining District Notebooks

1. Mining district summary sheet
2. Mint records, mineral resources material, Weed's Copper Handbook (colored sheets separate these sections)
3. Mining district articles listed alphabetically
4. Bibliography
5. Mine summary sheets with geologic data
6. Land status

VOL. 1

GENERAL ARTICLES

GROUND WATER QUALITY PROTECTION PERMIT

*GW Q PP - 0011-.02

JAN - 1987 SIGNED

FOR 141

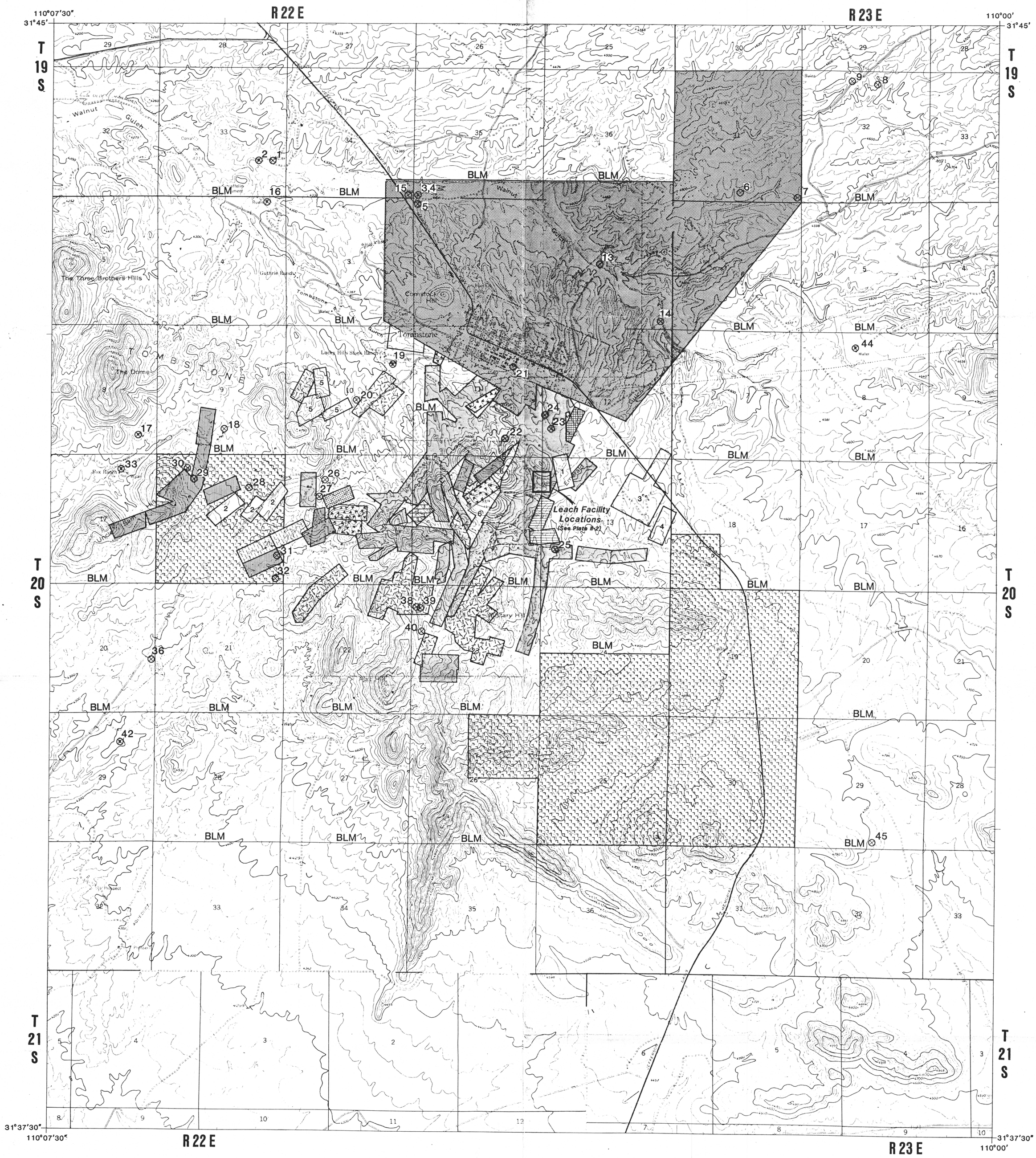
*GW QPP - 0019-02T

issued MAY 1988

Temporary ~~PP~~ QWQPP to finish CLEAN-UP.

* GW QPP 0020 -02

issue JAN. 1989



Legend:

Land Ownership

- Bureau of Land Management
- Tombstone Development Corp. / PBR Minerals, Inc.
- Urban Area
- State of Arizona
- Haber Corp. *Tombstone, Arizona*
- Escapule *Tombstone, Arizona*
- Bill Hart
- Bill Smith *Tombstone, Arizona*
- Bob Crist *Tucson, Arizona*
- Mrs. Betty Austring *Tombstone, Arizona*
- Lewis *Tucson, Arizona*
- University of Arizona *Tucson, Arizona*
- ⊗ Registered Water Well

1. Tracy Thomas *Tombstone, Arizona*
2. Tombstone Silver Mines *Tombstone, Arizona*
3. 3-Star Oil Company *Houston, Texas*
4. Harry Hughs *Tombstone, Arizona*
5. Tima and Assoc. *Tucson, Arizona*
6. City of Tombstone

North

SCALE: 1: 24000

0 2,000 4000'

FEET

GEOCHEMICAL ENGINEERING, INC.

Denver, Colorado

PBR MINERALS, INCORPORATED

Grand Central Leaching Facility

Tombstone, Arizona

Plate II-1

Facility Location Map, Land Ownership, and Registered Water Wells

(8/21/89)

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